QK
1
W44Z
BOT

WATSONIA

Journal of the Botanical Society of the British Isles

SMITHSONIAN
OCT 08 1997
LIBRARIES

Volume 21 Part 4 August 1997

Editors: M. Briggs, J. R. Edmondson, D. L. Kelly, C. D. Preston, B. S. Rushton, M. N. Sanford

ISSN: 0043-1532

Botanical Society of the British Isles

Patron: Her Majesty Queen Elizabeth the Queen Mother

Applications for membership should be addressed to the Hon. General Secretary, c/o Department of Botany, The Natural History Museum, Cromwell Road, London, SW7 5BD, from whom copies of the Society's Prospectus may be obtained.

Officers for 1997-98

President, Mr D. A. Pearman

President-elect, Mrs M. Briggs

Vice-Presidents, Mr R. G. Ellis, Dr C. D. Preston, Dr R. J. Gornall, Mr M. Walpole*

Honorary General Secretary, Mr R. G. Ellis

Honorary Treasurer, Mr M. E. Braithwaite*

**Elected at the Annual General Meeting, 17 May 1997*

Editors of *Watsonia*

Papers and Notes, J. R. Edmondson, D. L. Kelly, B. S. Rushton*, M. N. Sanford

Plant Records, C. D. Preston

Book Reviews, C. D. Preston

Obituaries, M. Briggs

*Receiving editor, to whom all MSS should be sent (see inside back cover).

© 1997 Botanical Society of the British Isles
The Society takes no responsibility for the views expressed by authors of Papers, Notes, Book Reviews or Obituaries.

The use of RAPD analysis to study diversity in British black poplar (*Populus nigra* L. subsp. *betulifolia* (Pursh) W. Wettst. (Salicaceae)) in Great Britain

J. E. COTTRELL,* G. I. FORREST & I. M. S. WHITE

Forestry Commission Research Agency, Northern Research Station, Roslin, Midlothian, Scotland, EH25 9SY

ABSTRACT

RAPD markers were used to study 36 accessions of British black poplar (*Populus nigra* subsp. *betulifolia* (Pursh) W. Wettst.). The twelve primers produced 44 consistent, distinct bands of which 22 were polymorphic. Seventeen distinct genotypes were identified which suggests that the number of clones remaining in Britain today is less than 1000. Genotypes were largely, though not entirely local in their distribution and genetic diversity was low. The results are discussed in terms of the conservation strategies which should be adopted.

KEYWORDS: DNA, clonal identification, random primers.

INTRODUCTION

Black poplar, *Populus nigra* L. subsp. *betulifolia* (Pursh) W. Wettst. is one of our largest and rarest British plants. It has recently become recognised that unless urgent conservation measures are undertaken the tree will become extinct within the next 20 years (Beyer 1995; Roe 1994).

It is a robust, dioecious tree growing to a height of 30 m, with a crown width of 20 m and a trunk diameter of up to 240 cm. Its taxonomic distinctness was first recognised in 1813, following its export to America, when it was named as *Populus betulifolius* by Frederick Pursh and as *Populus hudsonia* by Michaux (White 1993). It is widely accepted that it is native to Britain (Stace 1991; White 1993), and probably spread from Europe to Britain after the last glaciation. Today its distribution is confined to northern France, western Germany, parts of Ireland and southern Britain (Rogers 1995). It was once widespread south of a line from the Mersey to the Wash occupying the lowlands as far as the Thames basin and the River Severn, but today it has a sparse, scattered distribution throughout southern England and eastern Wales (Rogers 1995).

The tree has a long history of use by man. In some parts of the country it forms the centre of traditional village tree dressing events, the origins of which are unknown. It was even used for arrows by English bowmen (Roe 1994). Its timber was highly prized in the seventeenth century. Trees were planted near farms and the pollarded forms were used for scaffolding and fencing posts. It is a timber which resists shocks and this property led to its use in wagon bottoms, stable partitions and as buffers in early railway wagons (White 1993). The curved lower branches were used in the roofs of barns and houses (Rackham 1986). Its fire resistant qualities led to its use as flooring in the second storeys of country houses (White 1993). It was also widely used as an amenity tree in the Midlands and northern England because it was tolerant of industrial pollution (Rogers 1995).

Natural propagation by seed is virtually unknown (Milne-Redhead 1990). This is because male and female trees rarely grow together. In addition much of the floodplain woodland which is the natural habitat of the tree has been lost due to intensification of land management and as a result the exacting requirements of the seed for germination and subsequent growth cannot be met (White 1993). Also, even if the seeds successfully germinate, it cannot be certain that they are pure if introduced hybrid poplars are planted within pollinating distance.

Some natural vegetative propagation occurs (Mabey 1993). Black poplar roots readily, and parts

* Correspondence to J. E. Cottrell.

of trees growing along riverbanks can be broken off in winds and floods and swept downstream where they may take root and grow.

However, the majority of the remaining native black poplars are the result of vegetative propagation by man (Tabbush 1996), and most of the trees remaining today were planted when demand for the timber was high. A steady increase in the popularity of the hybrid poplar, *Populus* × *canadensis* Moench in the century after its introduction in 1750 resulted in the virtual cessation of any planting of black poplar after 1850 (White 1993). As a consequence there are few planted trees which are younger than 150 years old.

The inability of most botanists to distinguish black poplar from the hybrid forms meant that its abundance in Britain was greatly over-estimated and its endangered state was not recognised until relatively recently. Estimates of the number of black poplar trees remaining in Britain vary. A survey of black poplar sites conducted between 1973–88 (Milne-Redhead 1990) was extended in 1994 with the *Daily Telegraph* poplar survey. This indicated that there were fewer than 2000 trees remaining in Britain, of which less than 5% were females (Rogers 1995). Current opinion seems to be that many trees were omitted from this survey and the number of remaining trees may be double that originally indicated by the survey (Mabey 1996).

Some conservation work has already been undertaken; the Forestry Commission has set up several clone banks, where cuttings of carefully vetted clones are conserved. Due to the fact that most of the trees were vegetatively propagated by man it is likely that many of them are identical genotypes. The aim of the current work was to use randomly amplified polymorphic DNA (RAPD) markers to estimate the remaining diversity and to assess what proportion of the existing trees are clonal.

MATERIALS AND METHODS

Shoots with dormant or flushing buds were obtained from the native black poplar clonal collections in Norfolk and Gwent and from mature trees sampled in situ in the field (Table 1). The 36 accessions which were sampled represent a large part of the national range including six trees known to be females (Table 1).

DNA extractions were performed as described by Bousquet *et al.* (1990) with the incorporation of modifications for poplar developed by Bradshaw & Stettler (1993). Young, unexpanded leaves (100 mg) were frozen in liquid nitrogen and ground in a 1·5 ml Eppendorf vial using a motorised pestle. A small quantity of 106 μm glass beads (Sigma G4649) and 500 μl of extraction buffer (100 mM Tris-HCl (pH 9·5), 1·4 M NaCl, 20 mM EDTA, 2% CTAB, and 0·2% b-mercaptoethanol) were added gradually while the tissue was subjected to further grinding. After the addition of Proteinase K (100 μg per tube, Sigma P2308) each tube was incubated at 65° C for 1 h. Each sample was then treated to the following procedure: add 500 μl chloroform:isoamyl alcohol (iaa) (24:1), mix, centrifuge for 10 mins at 12000 rpm, remove the supernatant and mix with 500 μl phenol:chloroform:iaa (25:24:1). Centrifuge at 12000 rpm for 10 mins, remove the supernatant and mix with 500 μl chloroform:iaa (24:1). Centrifuge at 12000 rpm for 15 mins, remove the supernatant and mix with 500 μl ice cold isopropanol and 50 μl 3 M sodium acetate. Mix by inversion and leave to stand for 1 h for the DNA to precipitate. Centrifuge at 3500 rpm for 4 mins and dry the pellet under vacuum in a desiccator. Resuspend the pellet in 75 μl of TE buffer (10 mM Tris, 1 mM EDTA, pH 8·0). The concentration of DNA in the extract was estimated against known concentrations of lambda marker DNA (Sigma D9281) run on an agarose gel. A total of 23 10mer oligonucleotide random primers (Operon Technologies Inc.) were screened and twelve which gave reliable polymorphic bands were selected (Table 2). Duplicate PCR reactions of each sample were conducted in 25 μl containing 10 ng genomic DNA, 200 μM of each dNTP (Perkin-Elmer), 0·2 μM primer, 1·4 units Taq polymerase (Perkin-Elmer), 1·5 mM $MgCl_2$ (4·5 mM $MgCl_2$ with primers B15 and C19), and buffer containing 50 mM KCl, 10 mM Tris-HCl (pH 8·8 Perkin-Elmer). Reactions were overlaid with 25 μl mineral oil and were amplified in a Perkin-Elmer thermal cycler using the following programme: an initial step at 95° C for 5 mins followed by 45 cycles at 92° C for 1 min, 35° C for 1·5 mins, and 72° C for 2 mins. A final extension step at 72° C completed the amplification.

Samples were separated on 1·5% agarose gels run for 1·5 h at constant voltage of 80 V. Fragments were stained with ethidium bromide and photographed in UV-light. Bands were scored as present

TABLE 1. THE ORIGINAL LOCATION, VICE COUNTY, GRID REFERENCE, SOURCE AND SEX OF THE ACCESSIONS OF BLACK POPLAR USED IN THIS SURVEY

Original location	Vice county	Grid ref.	Source	Sex
Gellirhydd, Powys	42	SO/248.197	Clone bank	Male
Glanusk, Powys (1)	42	SO/196.199	Original tree	Male
Glanusk, Powys (2)	42	SO/214.182	Clone bank	Male
St Asaph, Clwyd	51	SJ/035.742	Original tree	Male
Llandyrnog, Clwyd	50	SJ/112.657	Original tree	Male
Magor, Gwent	35	ST/428.870	Clone bank	Male
Llanusk, Gwent (1)	35	SO/384.992	Clone bank	Male
Llanusk, Gwent (2)	35	SO/388.991	Clone bank	Male
Frampton Court, Gloucestershire	34	SO/748.077	Clone bank	Male
St Mary's Kempley, Gloucestershire	34	SO/669.313	Clone bank	Male
Wergins Bridge, Herefordshire	36	SO/528.447	Clone bank	Not known
Maund Court, Herefordshire	36	SO/567.507	Clone bank	Not known
Cotswold Water Park, Wiltshire	33	SU/052.954	Clone bank	Female
Chilcombe, Dorset	9	SY/529.904	Clone bank	Male
Fiddleford, Dorset	9	ST/798.136	Clone bank	Male
Isle of Wight	10	Not known	Clone bank	Not known
Longnor, Salop	40	SJ/487.004	Clone bank	Male
Corfton, Salop	40	Not known	Clone bank	Not known
Uffington, Oxfordshire	22	SU/303.889	Clone bank	Not known
Barn Elms, London	21	TQ/208.760	Clone bank	Not known
Aylesbury, Buckinghamshire	24	SP/834.144	Clone bank	Not known
Hartford Marina, Cambridgeshire	31	TL/268.724	Clone bank	Female
Wyton, Cambridgeshire	31	TL/280.750	Clone bank	Not known
Hobson's Conduit, Cambridgeshire	29	TL/455.560	Clone bank	Male
Drayton, Norfolk	27	TG/174.123	Clone bank	Male
Ryston Hall West, Norfolk	28	TF/622.001	Clone bank	Not known
Broome, Norfolk	27	TM/343.923	Clone bank	Male
Old Buckenham, Norfolk	27	TM/063.916	Clone bank	Female
Lowestoft, Suffolk	25	TM/526.907	Clone bank	Male
Framlingham, Suffolk	25	TM/285.631	Clone bank	Female
Thorington Street, Suffolk	26	TM/015.341	Clone bank	Male
Sudbourne, Suffolk	25	TM/438.527	Clone bank	Female
Wortham, Suffolk	25	TM/079.773	Clone bank	Male
Witnesham, Suffolk	25	TM/180.490	Clone bank	Male
Rochdale, Lancashire	59	Not known	Clone bank	Not known
Royal Botanic Garden, Edinburgh	83	Not known	Clone bank	Female

or absent. All PCR reactions were replicated and only those amplified fragment bands consistently visualised by gel electrophoresis were recorded. Comparison of RAPD profiles across and between gels was facilitated by running a standard lambda DNA standard marker on every gel (Ecor I Hind III Digest, Sigma D9281). A similarity coefficient for each pair of clones was calculated (Nei & Li 1979) and single linkage was used to produce a dendrogram.

RESULTS

The total number of bands which were recorded was 44 (Table 2), of which 22 were monomorphic and 22 were polymorphic (Fig. 1). The twelve primers distinguished 17 distinct genotypes among the 36 accessions. Seven of the genotypes were clonal and ten were unique. The original location of the 17 genotypes is shown in Fig. 2. The accessions belonging to Genotypes 5 and 6 largely occur in the east of the area sampled. The sample from the Edinburgh Botanic Garden belongs to Genotype 6,

TABLE 2. DETAILS OF THE RAPD AMPLIFICATION PRODUCTS USED IN THE ANALYSIS OF LEAF SAMPLES OF BLACK POPLAR

Band number	Size (kb)	Primer	Band number	Size (kb)	Primer
1	2690	A1	23	857	D2
2	1817	A1	24	1456	D5
3	722	A1	25	619	D5
4	659	A1	26	1247	D7
5	477	A1	27	789	D7
6	1614	A16	28	687	D7
7	1283	A16	29	500	D7
8	922	A16	30	2144	D8
9	812	A16	31	1685	D8
10	662	A16	32	1324	D8
11	2822	B15	33	1146	D8
12	2037	B15	34	2197	D11
13	1423	B15	35	1883	D11
14	1044	B15	36	993	D11
15	629	B15	37	587	E14
16	2061	C6	38	556	E14
17	1789	C6	39	899	G5
18	1379	C6	40	849	G5
19	1303	C19	41	678	G5
20	1171	C19	42	573	G5
21	1052	C19	43	558	G5
22	912	C19	44	421	G5

The base sequences (5′ to 3′) of the primers used are as follows: A1 = CAGGCCCTTC, A16 = AGCCAGCGAA, B15 = GGAGGGTGTT, C6 = GAACGGACTC, C19 = GGGGGTCTTT, D2 = GGACCCAACC, D5 = TGAGCGGACA, D7 = TTGGCACGGG, D8 = GTGTGCCCCA, D11 = ACGGCCATTG, E14 = TGCGGCTGAG and G5 = CTGAGACGGA.

and although its original source is unknown, these results would suggest that it probably originated from East Anglia. All members of Genotype 6 are females, which supports their allocation to a single genotype. Members of Genotypes 3 and 4 all have a western distribution as do seven of the eight accessions forming Genotype 1. Three accessions of Genotype 1 occur along the Usk river in South Wales and another two occur on the River Clwyd in North Wales. In contrast, some of the members of the smaller groups have a much wider distribution. For example, members of Genotype 7 occur on the Isle of Wight (v.c. 10) as well as in Suffolk (v.c. 25). Similarly, members of Genotype 2 occur as far apart as Dorset (v.c. 9) and Norfolk (v.cc. 27 & 29). The unique genotypes tend to be distributed in the centre of the country from Lancashire in the north to London and Oxfordshire in the south.

Although the genotypes revealed by the DNA analysis tended to be composed of individuals from a similar region, there was no evidence from the dendrogram that genotypes from one part of the country were more similar to other genotypes growing locally than to those growing in a different region (Fig. 3). For example, Genotype 4, composed of individuals from the Welsh borders was more similar to the East Anglian based Genotype 5 than to the geographically closer Genotype 1. In addition, there was no band which could be used to separate groups on the basis of their geographic location. The significance of the relative position of the different genotypes in the dendrogram should not be overstated as most only differed from each other by a few bands.

All the accessions except one converged at a similarity greater than 94%. The exception was the sample from Barn Elms (v.c. 21) in London which revealed less than 80% similarity to any other sample. If this accession was omitted from the analysis only twelve of the 44 bands revealed polymorphisms. When this accession was first brought into the clone bank anxieties were expressed regarding the existence in this sample of certain features which were consistent with those of hybrid trees. Its hybrid status is further supported by the observation (Cottrell *et al.* 1997) that product A1–477, present in this accession, never occurred in non-hybrid *Populus nigra*.

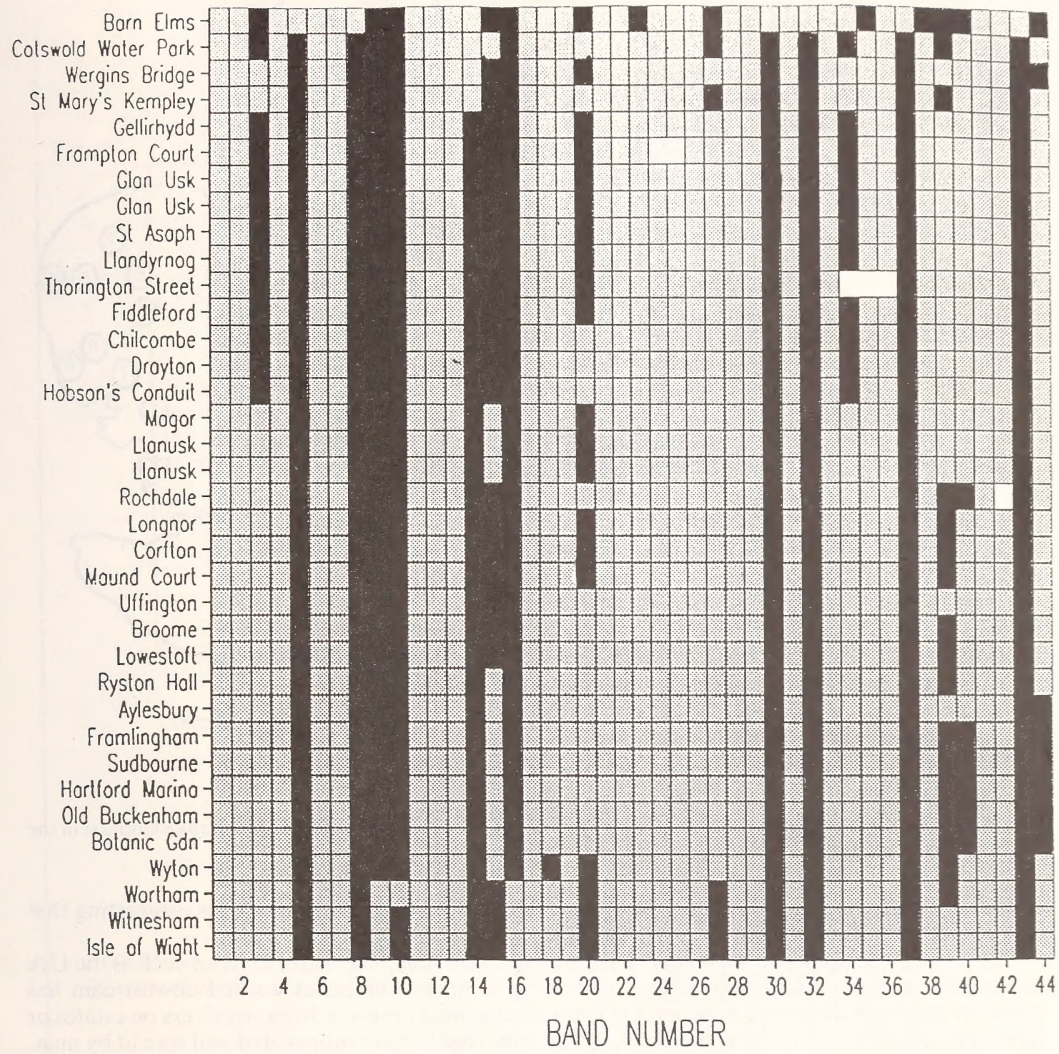


FIGURE 1. The presence or absence of RAPD bands (1–44) in each of the 36 samples of *Populus nigra* subsp. *betulifolia* examined. The samples are arranged in the same order as the similarity analysis reported in Fig. 3. □ = present; ■ = absent; ▨ = missing value.

DISCUSSION

Twelve primers are generally thought to be sufficient to identify common genotypes and therefore it is likely that all the genotypes in our sample were successfully identified (H. D. Bradshaw, pers. comm.). We cannot be absolutely certain, however, that by using more primers we could not have further split the groups.

The fact that 17 genotypes were identified among the 36 accessions implies that, on average, 50% of the population consists of genetically distinct individuals. However, this may be an overestimate since the accessions were obtained from as broad a geographic range as possible and more localised clusters of trees have a greater probability of being clonal. The situation is even more critical for

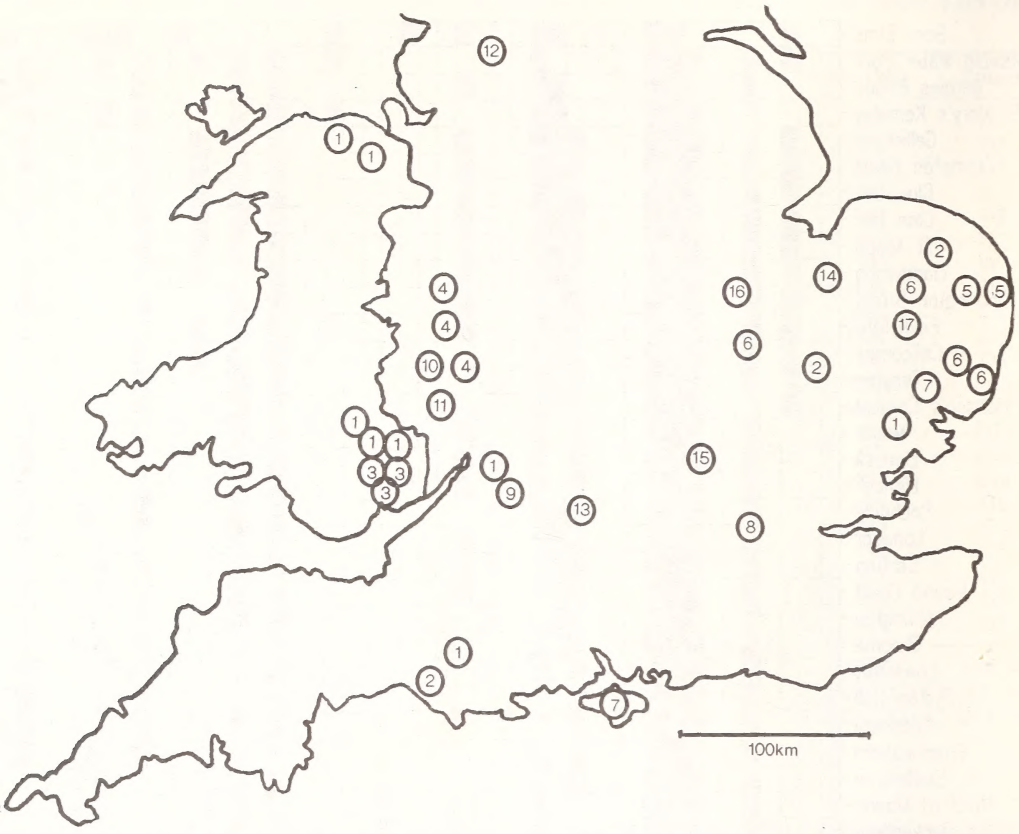


FIGURE 2. The original locations of each of the 17 genotypes of *Populus nigra* subsp. *betulifolia* identified in the RAPD study.

female trees where only two distinct genotypes were identified in the six samples, suggesting that only 33% of the female trees are distinct genotypes.

The finding that some accessions of the same clone occur along the banks of rivers such as the Usk suggest that some natural propagation via rooting of broken branches washed downstream has probably occurred. However, the fact that many trees grow a long way from any rivers on estates or farmland indicates that in many cases genotypes were vegetatively propagated and spread by man. In the majority of cases the planting material was probably from local stock as clonal groups tend to grow predominantly in the same local area.

It is not known whether any clones possess any particular attributes which would have favoured them as planting stock. The fact that members of Genotype 1 have a wide distribution from Wales, Dorset and Suffolk may indicate that this clone was selected for some reason. The clone known as the Manchester poplar was selected as an amenity tree and has been widely planted in the northern part of the range (Stace 1971); this clone was not represented in our sample. The only other indication of any artificial selection is the imbalance between the numbers of males and females. It is thought that male trees were favoured by the seventeenth century planters because they do not form the untidy seed fluff which emanates from female trees.

At the species level samples of *Populus nigra* have previously been found to converge at 63% similarity when calculated using the Jaccard formula (Cottrell *et al.* 1997) which is equivalent to 77% using the Nei & Li (1979) method. Thus our value of 94% for *Populus nigra* subsp. *betulifolia* indicates that, as might be expected, the genetic diversity present in the subspecies is much less than that in the species as a whole. It remains unknown whether the original diversity of the sub-species has been significantly depleted by habitat erosion.

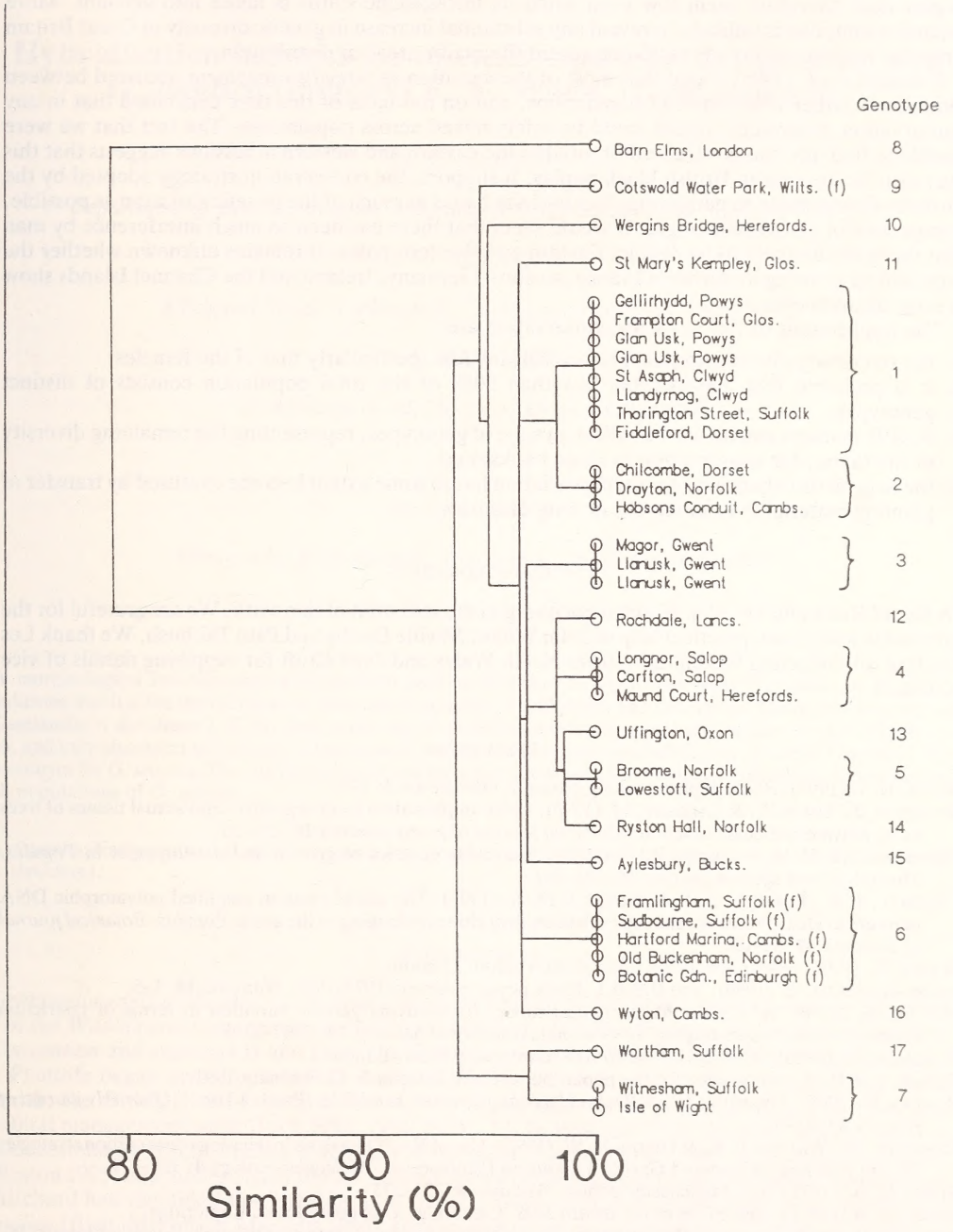


FIGURE 3. Dendrogram showing the percentage similarity between the samples of *Populus nigra* subsp. *betulifolia* used in the RAPD analysis.

It is difficult to find comparable data, but in the endangered Australian species *Grevillea scapigera* Rossetto *et al.* (1995) found that all the samples converged above 75% similarity and considered this level of diversity to be high for an endangered species. The remaining diversity present in black

poplar does therefore seem low even when its infraspecific status is taken into account. More intensive sampling is unlikely to reveal any substantial increase in genetic diversity in Great Britain since the accessions already tested represent the major areas of distribution.

Rossetto *et al.* (1995) found that most of the variation in *Grevillea scapigera* occurred between individuals rather than between populations, and on the basis of this they concluded that in any conservation programme plants could be safely mixed across populations. The fact that we were unable to find any bands which differentiated the eastern and western accessions suggests that this may also be the case in British black poplar. It supports the conservation strategy adopted by the Forestry Commission to gather together in clone banks as much of the genetic variation as possible, irrespective of geographic origin. It would seem that there has been so much interference by man that there are unlikely to be distinct Eastern and Western types. It remains unknown whether the populations growing in northern France, western Germany, Ireland and the Channel Islands show greater distinctness.

The implications of this work for conservation are:

1. the remaining diversity appears to be critically low, particularly that of the females;
2. it is probable that considerably less than 50% of the total population consists of distinct genotypes;
3. RAPD markers can be used to select a range of genotypes, representing the remaining diversity of the taxon, for conservation in clone banks; and
4. the natural distribution of genotypic variation has to some extent become confused by transfer of planting material over moderate or long distances.

ACKNOWLEDGMENTS

Dr David Rook and Dr Alan Fletcher encouraged the initiation of this work. We are grateful for the invaluable advice and practical help of John White, Neville Danby and Paul Tabbush. We thank Les Starling for collecting the material from North Wales and Jane Croft for supplying details of vice counties.

REFERENCES

Beyer, R. I. (1995). Black poplar working group. *Poplar forum* **3**: 2–3.

Bousquet, J., Simon, L. & Lalonde, M. (1990). DNA amplification from vegetative and sexual tissues of trees using polymerase chain reaction. *Canadian journal of forest research* **20**: 254–257.

Bradshaw, H. D. & Stettler, R. F. (1993). Molecular genetics of growth and development in *Populus*. *Theoretical and applied genetics* **86**: 301–307.

Cottrell, J. E., Forrest, G. I. & White, I. M. S. (1997). The use of random amplified polymorphic DNA markers to identify and estimate the relatedness of clones belonging to the genus *Populus*. *Botanical journal of Scotland* **49**: 89–102.

Mabey, R. (1996). *Flora Britannica*. Sinclair-Stevenson, London.

Milne-Redhead, E. (1990). The B.S.B.I. Black popular survey, 1973–1988. *Watsonia* **18**: 1–5.

Nei, M. & Li, W. H. (1979). Mathematical model for studying genetic variation in terms of restriction endonucleases. *Proceedings of the National Academy of Sciences* **74**: 5267–5273.

Rackham, O. (1986). *A history of the British countryside*. Dent, London.

Roe, P. (1994). A cutting edge for the poplar hunt. *Daily Telegraph*, 12 February 1994.

Rogers, E. (1995). The native Black Poplar (*Populus nigra* var. *betulifolia* (Pursh.) Torr.). *Quarterly journal of forestry* **89**: 33–37.

Rossetto, M., Weaver, P. K. & Dixon, K. W. (1995). Use of RAPD analysis in devising conservation strategies for the rare and endangered *Grevillea scapigera* (Proteaceae). *Molecular ecology* **4**: 321–329.

Stace, C. A. (1971). The Manchester poplar. *Watsonia* **8**: 391–393.

Stace, C. A. (1991). *New Flora of the British Isles*. Cambridge University Press, Cambridge.

Tabbush, P. (1996). Native poplars and the reforestation of floodplain forests. *Quarterly journal of forestry* **90**: 128–135.

White, J. E. (1993). *Black poplar: the most endangered native timber tree in Britain*. Forestry Commission research information note: 239.

(*Accepted January 1997*)

Hybridisation between *Gentianella amarella* (L.) Boerner and *G. anglica* (Pugsley) E. F. Warb. (Gentianaceae)

T. C. G. RICH

Department of Botany, National Museums & Galleries of Wales, Cardiff, CF1 3NP

D. T. HOLYOAK

8 Edward Street, Tuckingmill, Camborne, Cornwall, TR14 8PA

L. J. MARGETTS

16 Ashleigh Road, Honiton, Devon, EX14 8TD

and

R. J. MURPHY

Shang-ri-la, Reskadinnick, Camborne, Cornwall, TR14 0BH

ABSTRACT

A morphological investigation of *Gentianella anglica* (Pugsley) E. F. Warb. subsp. *cornubiensis* Pritchard indicates that it is the hybrid between *Gentianella amarella* (L.) Boerner and *G. anglica*. The hybrid is named as **Gentianella** × **davidiana** T. C. G. Rich, **hybr. nov**. It is recorded from the southern English v.cc. 1, 4, 10, 14 and 16, and may also occur elsewhere. A lectotype is selected for *Gentiana amarella* L. var. *praecox* Townsend, the basionym for *G. anglica*. The current evidence indicates hybridisation may be a threat to survival of some but not all populations of *G. anglica*.

KEYWORDS: Early gentian, *Gentiana amarella* var. *praecox*, *Gentianella anglica* subsp. *cornubiensis*, *Gentianella* × *davidiana*.

INTRODUCTION

Gentianella anglica (Pugsley) E. F. Warb. is a rare, English endemic. It is protected under Schedule 8 of the *Wildlife and Countryside Act 1981* (as amended). It is also listed in Appendix 1 of the *Bern Convention* and Annexes II and IV of the European Community *Habitat and Species Directive*.

Plantlife began conservation work on *G. anglica* in Surrey in 1993 at the request of Mrs Joyce Smith, the B.S.B.I. vice-county recorder, and began monitoring populations and carrying out habitat management work (Rich 1993, 1994, 1995a, b). In 1994 and 1995, the work was extended to Gloucestershire (Rich, Kitchen & Kitchen 1995), Kent (Rich & Phillip 1995), Lincolnshire (Rich & Weston 1995) and Sussex (Rich 1995c). After a review of the status of *G. anglica* subsp. *cornubiensis* Pritchard had identified that hybridisation with *G. amarella* (L.) Boerner might be a threat to *G. anglica* (Rich, Murphy & Margetts 1995), the Cornish plants were investigated in 1995. Populations are also being investigated independently in the Isle of Wight by Mrs Susan Telfer (Telfer 1994, 1995). A reasonably up-to-date distribution map of *G. anglica* is given by Chatters (1994).

Our current understanding of the taxonomy of *G. anglica* is based on work by Pritchard (1959), which suggested that there are striking differences between plants from dunes and cliff tops in Cornwall and plants from elsewhere in England. The Cornish plants were described as having a higher average number of internodes, slightly contracted terminal internodes, longer corollas,

axillary flowers and were seldom branched from the base. Pritchard suggested that the position of the Cornish plants was somewhat intermediate between *G. anglica* and *G. amarella*, though closer to the former, and chose to recognise this variation by describing the Cornish plants as a subspecies of *G. anglica* based on the morphological and ecological differences and disjunct distribution on one hand, and the morphological similarities and the similar flowering time on the other.

At the time, an alternative explanation of the intermediate Cornish plants as hybrids seems to have been dismissed due to the apparent differences in flowering time of the two species, with Cornish and other *G. anglica* reported flowering early in the year to 12 July, and *G. amarella* later in the season from 22 July onwards (Pritchard 1959). Pritchard (1972) later stated "A very few specimens have been questioned as possible intermediates, but I have seen no populations which suggest any measure of hybridisation". Hybridisation with *G. amarella* was, however, recognised in closely related taxa such as *G. uliginosa* (Willd.) Boerner and *G. germanica* (Willd.) Boerner (Pritchard 1959, 1961).

The first report of hybridisation between *G. anglica* and *G. amarella* was of a huge hybrid swarm found at Penhale Sands (Gear Sands), Cornwall in 1966 by L. J. Margetts (Margetts & David 1981), and hybrids were later reported from Braunton Burrows, Devon (Margetts 1987). During field work in 1994 and 1995 populations of *G. anglica*, *G. amarella* and morphologically intermediate plants were seen flowering at the same time in Sussex and Kent.

A more detailed analysis of populations with intermediate plants and subsp. *cornubiensis* was therefore carried out in 1995. These morphological comparisons of populations have led the authors to the view that the variation in Cornwall is due to hybridisation, and that subsp. *cornubiensis* cannot be maintained as a separate subspecies.

METHODS

The comparative morphology of *Gentianella* was investigated mainly in the field. The low numbers of plants in most *G. anglica* populations mean it is undesirable to collect plants as voucher specimens or take seed for cultivation experiments (*Gentianella* has also proved difficult to cultivate; Pritchard 1959, Zopfi 1991). There is very little isozyme variation in *Gentianella* (A. Lack & Q. O. N. Kay, pers. comm. 1995), and the chromosome numbers of *G. anglica* and *G. amarella* are both $2n = 36$ (J. P. Bailey, pers. comm. 1995).

Population sizes of *G. anglica* are generally very small, and variable from year-to-year partly due to its biennial habit. Wherever possible, a random sample of at least 15 plants in each separate population or sub-population (e.g. separate dune slacks) was measured, though only smaller populations were present at some sites and smaller samples available in some herbarium collections. Damaged plants were not measured. Some populations were visited twice to record early- and late-flowering plants. Pritchard (1959) does not indicate the numbers of plants included in his analysis.

Some historical herbarium specimens in **BM**, **BRISTM**, **E**, **K**, **NMW**, **OXF** and **SLBI** were examined including the type of subsp. *cornubiensis* (Perranporth, heathland by roadside, Cornwall, 20 June 1919, *F. Robinson*, **BM**). These included specimens seen by Pritchard.

After an initial screening of the characters used to separate *G. amarella* from *G. anglica* and its two subspecies, those best suited for measurement and distinguishing the taxa were narrowed down to four (Fig. 1):

1. Corolla size (mm), measured from the base of the calyx to the tip of the lobes on the terminal flower or the next largest if this was unavailable.
2. Number of internodes. It was not always easy to distinguish between the basal rosette and the lowest node; the first obvious gap was taken as the lowest internode. A number of plants had an extra solitary, small leaf above the terminal node; this leaf was ignored.
3. Height of main stem (mm), measured from the basal rosette to the terminal node on the main stem.
4. Length of terminal internode (mm), measured from the terminal node to the node below. In plants with one internode this length was measured to the basal rosette.

For some plants where flowering had finished, no corolla measurements were available. Observations of plants in Cornwall suggest that the stem, terminal internode and especially pedicels

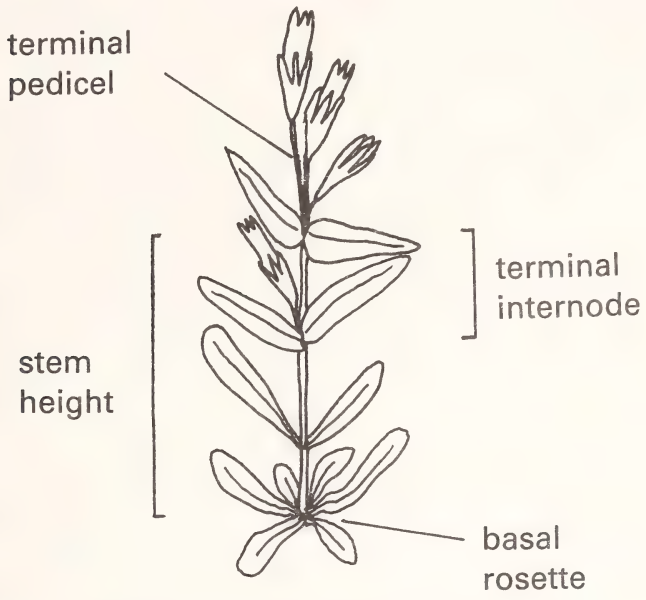


FIGURE 1. Stylised *Gentianella* plant showing measurements of stem height and the terminal internode.

may continue to grow slightly during flowering and while seed ripens. Some plants only had a basal rosette and thus had no height or terminal internode measurement. Characters 3 and 4 were used to calculate the percentage that the terminal internode contributes to the height of the stem; this is similar to Pritchard's (1959) "(log A/T Int.) + 1" character which also describes the contribution of terminal internode to the height.

For each character, the population mean and standard error were calculated.

RESULTS

The measurements from the populations investigated are summarised in Table 1 and detailed data for selected characters are plotted in Figs 2–5 for populations of *G. anglica* from eastern England and Cornwall, for *G. amarella* and for some mixed populations from England. Means for all populations are summarised in Figs 6 & 7.

As found previously by Pritchard (1959), *Gentianella* taxa are variable within populations and differ between populations. Some populations were clearly referable to *G. anglica* or *G. amarella*. There was considerably more variation in plants from Cornwall than was expected, and at least three intermediate populations were also found elsewhere in Britain. These three cases are described below.

CHARACTERS DISTINGUISHING *G. ANGLICA* AND *G. AMARELLA*

In general we agree with Pritchard (1959) on the characters used to distinguish *G. anglica* and *G. amarella*. We found that the best characters are the number of internodes, percentage of height of stem contributed by the terminal internode, and the flowering time.

G. anglica usually has distinctly fewer internodes than *G. amarella*. A population mean of less than 3 internodes is considered to be characteristic of *G. anglica* with the number ranging from 0 to 4 internodes for any one plant within a population (Figs 2 & 7). A mean of 5 or more internodes is accepted as characteristic of *G. amarella*, ranging from (4–) 5–11 internodes for individual plants in a population (e.g. Figs 4 & 7) as previously described for this taxon. Pritchard (1959) noted that the number of internodes in *G. amarella* varies quite markedly in different parts of Britain.

TABLE 1. POPULATION MEANS (± STANDARD ERROR) FOR MEASUREMENTS OF *GENTIANELLA ANGLICA*, *G. AMARELLA* AND HYBRID POPULATIONS

Population	n	Corolla length (mm)	Number of internodes	Stem height (mm)	Length of terminal internode (mm)	Percentage of height contributed by terminal internode (%)
G. anglica						
1. Braunton, 3	1	11	1	2	2	100
2. Braunton, 1	15	16·7±0·75	2·4±0·3	10·5±2·1	4·2±0·63	48·7±5·3
3. Ivinghoe, 1	15	13·1±0·11	1·3±0·11	2·7±0·47	2·4±0·43	90·4±4·8
4. Ivinghoe, 2	15	15·7±0·55	1·4±0·12	10·1±1·4	8·5±0·96	88·4±3·5
5. Trottiscliffe	5	18 ±0·4	3·0±0	24·2±1·2	10·8±2·2	45·9±10
6. Barnstead	6	17 ±0·23	2 ±0·23	19·8±7·2	11 ±3·2	66·3±7·9
7. Beachy Head	15	15 ±0·6	2·7±0·22	19·3±2·95	8·9±1·6	45·1±4·8
8. Freshwater	15	15·9±0·5	2·3±0·12	19·9±2·2	13·3±1·8	67·1±3·7
9. Edlington	15	16·1±0·4	1·5±0·21	11·3±2·6	8·3±1·4	87·1±4·9
10. Durlston Head	12	15·9±0·34	1·5±0·19	21·5±2·4	16·9±1·4	82·4±4·3
11. Ventnor	9	13·8±0·3	2·7±0·16	26·3±2·37	13·9±1·5	54·4±4·7
12. Steephill (type)	8	16·1±0·21	2·9±0·28	23·4±3·6	16·6±3·0	70·2±5·5
G. anglica, Cornwall						
13. Porthtowan, 1	14	16·9±0·33	2·8±0·2	21·9±1·9	6·8±0·78	34·3±4·4
14. Porthtowan, 2	15	14·6±0·61	1·6±0·2	6·5±1·3	3·8±0·94	68·2±7·52
15. Gear Sands, 1	15	16·3±0·5	2·5±0·16	8·3±1·12	4·7±0·65	58·6±4·1
16. Gear Sands, 2	15	13·8±0·7	2·1±0·19	4·4±0·56	2·1±0·27	56·9±6·8
17. Perranporth	15	13·6±0·5	1·5±0·3	8·7±1·5	4·5±0·62	68·0±9·3
18. Perranzabuloe	1	20	4·0	55	19	34.5
19. Perranporth	10	16 ±0·32	4·7±0·53	34·4±4·3	10·6±1·2	36·6±5·8
G. × *davidiana*						
20a. St Boniface Downs	1	15	5	67	23	34
20b. St Boniface Downs	9	16·33±0·72	4·11±0·43	53 ±6.2	27 ±2.7	56 ±5.9
21. Beachy Head	15	14·7±0·42	4·1±0·22	26·5±3·5	2·3±0·51	12·1±3·1
22. Braunton	15	17·3±0·43	3·9±0·22	24·8±2·6	7·4±0·98	33·6±4·4
23. Gear, 2	15	16·9±0·6	3·7±0·2	16·3±1·8	3·5±0·8	21·5±3·6
24. Gear 2 (DTH)	30	9·4±0·3	4·1±0·21	12·3±1·5	2·7±0·38	27·1±3·5
25. Mount	15	16·2±0·4	2·9±0·2	20 ±2·2	9·5±1·3	49·3±4·4
26. Trottiscliffe	15	17·5±0·42	4·8±0·17	40·4±3·8	4·2±0·74	11·6±1·6
G. amarella						
27. Arundel	12	13·8±0·6	6·8±0·26	31·8±4·0	5·7±1·41	17·8±2·72
28. Banstead	15	13·3±0·28	7·3±0·33	85·7±8·1	6·2±1·3	7·7±1·4
29. Braunton, 1	15	12·3±0·3	8·4±0·2	50·1±4·3	1·9±0·19	3·9±0·41
30. Braunton, 3	12	17 ±1·25	5·3±0·17	73·7±11·9	5·9±1·1	8·7±0·93
31. Gear Sands, 2	15	–	5·5±0·13	28·1±2·0	1·8±0·27	6·3±0·75
32. Noar Hill	15	15 ±0·41	8·0±0·3	88·9±7·7	8·3±1·5	9·4±1·6
33. Watergate	15	13·7±0·3	6·9±0·26	21·6±2	2·9±0·3	14·9±2
34. Beachy Head	15	16·8±0·2	6·7±0·15	25·9±1·74	3·8±0·53	14·74±1·5
35. Whitford	8	15·9±0·3	8·2±0·23	101·9±7·3	4·0±0·3	4·1±0·38

The sources are as follows: 1. Braunton, Raven Slack, Devon, 12 June 1995, T. C. G. Rich, P. A. Smith & J. Breeds. 2. Braunton, Old Met Slack, Devon, 12 June 1995, T. C. G. Rich, P. A. Smith & J. Breeds. 3. Ivinghoe top, Buckinghamshire, 20 June 1995, T. C. G. Rich & R. Maycock. 4. Ivinghoe west, Buckinghamshire, 20 June 1995, T. C. G. Rich & R. Maycock. 5. Trottiscliffe, Kent, 18 June 1995, T. C. G. Rich & E. Philp. 6. Banstead, Surrey, 17 June 1995, T. C. G. Rich & Mrs P. Livermore. 7. Beachy Head, Sussex, June 1995, T. C. G. Rich & P. G. Angold. 8. Freshwater, chalk downs, Isle of Wight, June 1910, *H. E. Fox* (**BM**). 9. Edlington, downs, Wiltshire, 1 June 1903, *E. S. Marshall* (**BM**). 10. Durlston Head, Dorset, 24 May 1889, *E. F. Linton* (**BM**). 11. Ventnor Downs, Isle of Wight, May 1891, *J. H. A. Stuart* (**BM**). 12. Steephill, chalk down, Isle of Wight, 27 May 1878, *F. Stratton* (**OXF**; isotype). 13. Porthtowan, Cornwall, 21 June 1905, *F. H. Davey* (**BM**). 14. Porthtowan,

cliff, Cornwall, 8 June 1995, T. C. G. Rich, D. T. Holyoak, J. Clitherow & R. J. Murphy. 15. Gear Sands, top, Cornwall, 9 June 1995, T. C. G. Rich, D. T. Holyoak, C. French & R. J. Murphy. 16. Gear Sands by large dune, Cornwall, 9 June 1995, T. C. G. Rich, D. T. Holyoak, C. French & R. J. Murphy. 17. Perranporth, heathland by roadside, Cornwall, 20 June 1919, *F. Robinson* (**BM**). 18. Penhale, Perranzabuloe, Cornwall, 26 March 1907, *J. F. P[ickard?]* (**BM**; type specimen of *G. anglica* subsp. *cornubiensis*). 19. Perranporth sand hills, 13 August 1915, *F. Rilstone* (**NMW**). 20. St Boniface Downs, 26 June 1925, *R. Melville* (**NMW**); 20a holotype. 20b complete sheet. 21. Beachy Head, Sussex, June 1995, T. C. G. Rich & P. G. Angold. 22. Braunton, north of Vennor's Pond, Devon, 12 June 1995, T. C. G. Rich, P. Smith & J. Breeds. 23. Gear Sands, by large dune, Cornwall, 9 June 1995, T. C. G. Rich, D. T. Holyoak, C. French & R. J. Murphy. 24. Gear Sands, Cornwall, 9 July 1995, D. T. Holyoak. 25. Mount, Cornwall 9 June 1995, T. C. G. Rich, D. T. Holyoak, C. French & R. J. Murphy. 26. Trottiscliffe, Kent, 18 June 1995, T. C. G. Rich & E. Phillip. 27. Arundel Park, Sussex, 21 July 1995, T. C. G. Rich. 28. Banstead, Surrey, 28 August 1995, T. C. G. Rich. 29. Braunton, Old Met Slack, Devon, 20 September 1995, T. C. G. Rich. 30. Braunton, Raven Slack, Devon, 20 September 1995, T. C. G. Rich. 31. Gear Sands by large dune, Cornwall, 9 June 1995, T. C. G. Rich, D. T. Holyoak, C. French & R. J. Murphy. 32. Noar Hill, Hampshire, 17 August 1995, T. C. G. Rich. 33. Watergate near Newquay, 30 August and 26 September 1901, *A. O. Hume* (**SLBI**). 34. Beachy Head, 21 August 1907, *A. O. Hume* (**SLBI**). 35. Whitford Burrows, Glamorgan, 5 August 1995, T. C. G. Rich, M. Kitchen & Q. O. N. Kay.
n: number of plants.

In *G. anglica*, the terminal internode is generally longer than the other internodes and when present contributes a mean of 40–100% of the height of the stem, ranging from (20%–) 30%–100% for individual plants (Figs 2 & 7). In *G. amarella* the terminal internode is usually shorter than the other internodes; it usually contributes a mean of less than c. 20% to the height of the stem, ranging from 1%–c. 35% in individual plants, the latter exceptionally (Figs 2 & 7).

There is a strong negative relationship between the number of internodes and the percentage of the stem height contributed by the terminal internode (Fig. 7).

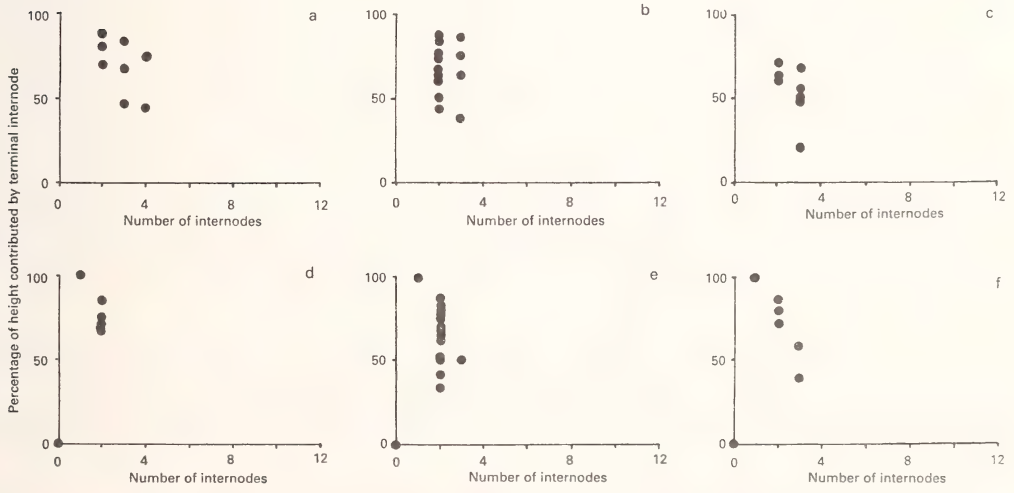


FIGURE 2. Number of internodes plotted against percentage of height contributed by the terminal internode to the height of the stem for populations of *Gentianella anglica*. a. Steephill, chalk down, Isle of Wight, 27 May 1878, *F. Stratton* (**OXF**; lectotype). b. Freshwater, chalk downs, Isle of Wight, June 1910, *H. E. Fox* (**BM**). c. Ventnor Downs, Isle of Wight, May 1891, *J. H. A. Stuart* (**BM**). d. Durlston Head, Dorset, 24 May 1889, *E. F. Linton* (**BM**). e. Ivinghoe, Buckinghamshire, 20 June 1995. f. Edlington, downs, Wiltshire, 1 June 1903, *E. S. Marshall* (**BM**).

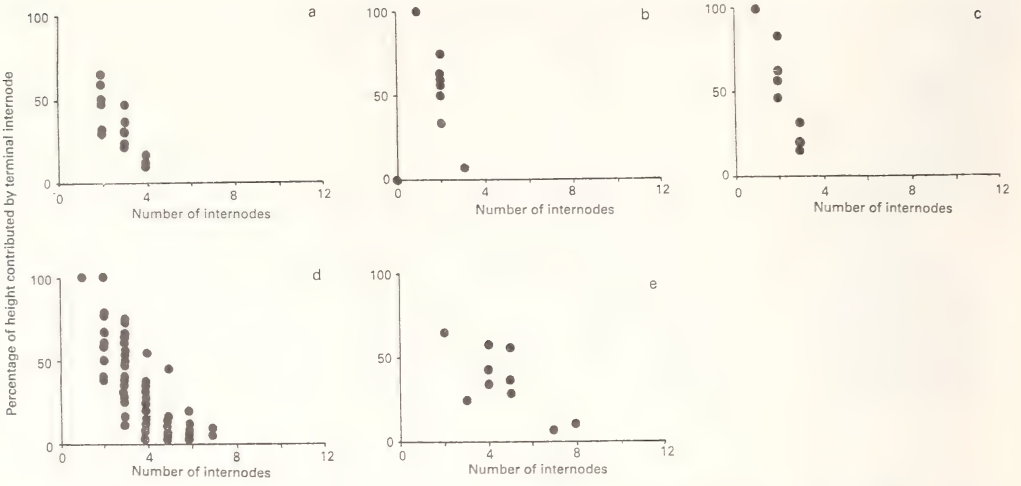


FIGURE 3. Number of internodes plotted against percentage of height contributed by the terminal internode to the height of the stem for populations of *Gentianella anglica* from Cornwall. a. Porthtowan, Cornwall, 21 June 1905, *F. H. Davey* (**BM**). b. Porthtowan, cliff, Cornwall, 8 June 1995. c. Perranporth, heathland by roadside, Cornwall, 20 June 1919, *F. Robinson* (**BM**). d. Perranporth, Cornwall, 9 June and 9 July 1995. e. Perranporth, Cornwall, 13 August 1915, *F. Rilstone* (**NMW**).

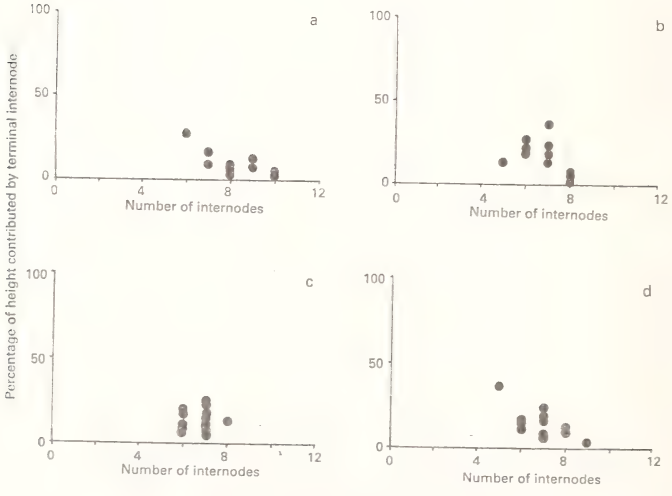


FIGURE 4. Number of internodes plotted against percentage of height contributed by the terminal internode to the height of the stem for populations of *Gentianella amarella*. a. Noar Hill, Hampshire, 17 August 1995. b. Arundel Park Sussex, 21 July 1995. c. Beachy Head, 21 August 1907, *A. O. Hume* (**SLBI**). d. Watergate near Newquay, 30 August and 26 September 1901, *A. O. Hume* (**SLBI**).

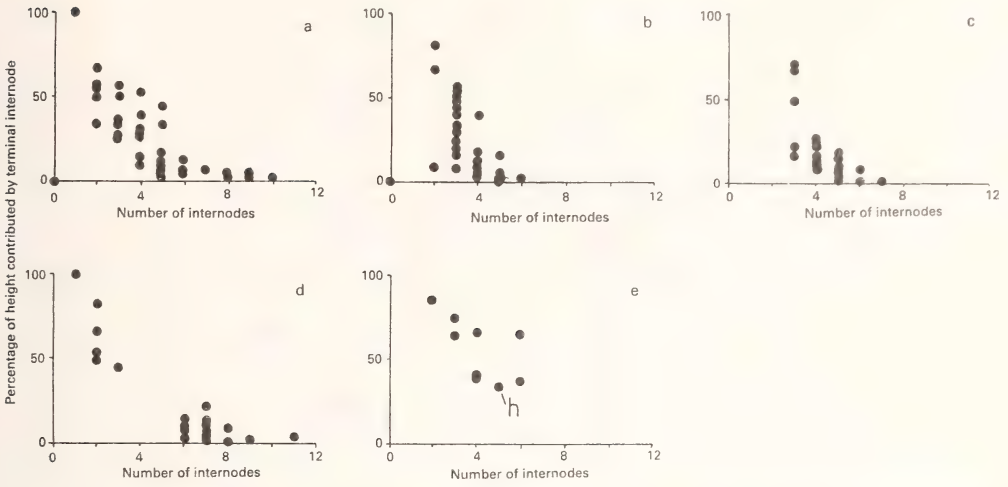


FIGURE 5. Number of internodes plotted against percentage of height contributed by the terminal internode to the height of the stem for populations of *Gentianella* from elsewhere in southern England. a. Braunton, Devon, 12 June and 20 September 1995. b. Beachy Head, Sussex, June 1995. c. Trottiscliffe, Kent, 18 June 1995. d. Banstead, Surrey, 17 June and 28 August 1995. e. St Boniface Downs, Isle of Wight, 26 June 1925, *R. Melville* (NMW); h = holotype of *G.* × *davidiana*.

Both species can flower together and have been observed doing so. *G. anglica* flowers earlier in the year than *G. amarella*, usually from late April to June, but extending from early March to the middle of July. *G. amarella* usually flowers from early July, though an early-flowering form is known in south Wales and south-west England (Pritchard 1959; observations by L. J. Margetts).

Of the characters not investigated in detail, *G. anglica* is usually smaller and more branched from the base than *G. amarella*. *G. anglica* tends to have narrower leaves; though it is a very variable character with much overlap, the vegetative plants cannot be determined with certainty using this character. The terminal pedicel of *G. anglica* contributes more to the plant height than in *G. amarella*, its calyx teeth are shorter than the tube (this character is of no use in distinguishing the taxa), and it usually has more unequal calyx teeth than in *G. amarella* though the variation in *G. amarella* means that this is also of little practical use in distinguishing the species. There is also a subtle colour difference in the flowers which is difficult to describe in words: *G. anglica* tends to have flowers towards the blue end of violet, whilst in *G. amarella* they tend to be towards the purple end of violet.

CHARACTERS DISTINGUISHING *G. ANGLICA* SUBSP. *ANGLICA* AND SUBSP. *CORNUBIENSIS*

The main characters used by Pritchard (1959) to distinguish *G. anglica* subsp. *cornubiensis* from subsp. *anglica* were its higher average number of internodes, its relatively shorter terminal internodes, its longer corollas, the presence of axillary flowers, and its plants seldom being branched from the base.

However, plants morphologically indistinguishable from subsp. *anglica* elsewhere in England were found near Porthtowan and Perranporth, Cornwall (Fig. 7). Some populations near Perranporth were mixed with more variable plants, some of which agreed with the description of subsp. *cornubiensis*, while others agreed with *G. amarella* (otherwise a rare plant in Cornwall) (Fig. 3d). There is almost complete overlap between the corolla lengths, number of internodes and percentage of height contributed by the terminal internode of *G. anglica* plants from Cornwall (Porthtowan, Perranporth, Gear Sands, Mount) and *G. anglica* and intermediates from elsewhere (Table 1).

The length of the corolla does not correlate with other characters or with the place of origin of plants, and there is much overlap between the different populations (Fig. 6). The type specimen of

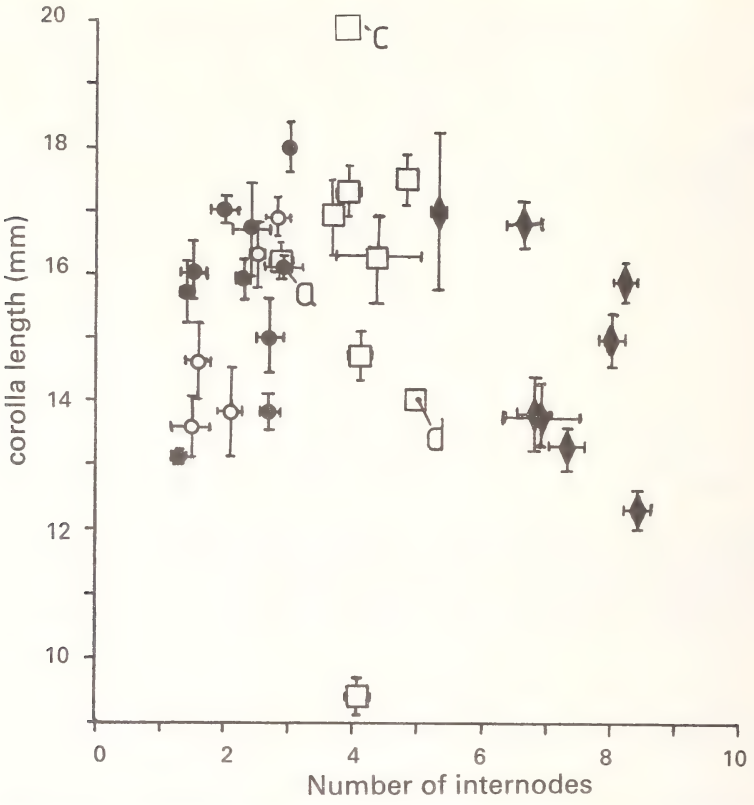


FIGURE 6. Number of internodes plotted against corolla length (mm) for populations of *Gentianella*. Points are population means and standard errors (see Table 1). ○ *G. anglica* from Cornwall; ● *G. anglica* from elsewhere in Britain; ◆ *G. amarella*; □ intermediates between *G. anglica* and *G. amarella*; a, lectotype of *G. anglica*; c, holotype of subsp. *cornubiensis*; d, holotype of *G.* × *davidiana*.

subsp. *cornubiensis* has one of the longest corollas seen and is not representative of other Cornish plants. Another set of corolla measurements from Gear Sands on 9 July 1995 were much shorter than normal, probably due to the effects of drought.

Thus Cornish *G. anglica* populations cannot be distinguished satisfactorily from *G. anglica* from elsewhere using the characters investigated. Indeed, the population from the cliffs at Porthtowan (Table 1, no. 14), regarded by Pritchard (1972) as "the pure facies of *cornubiensis*", has fewer internodes and a smaller corolla than plants from the type locality of subsp. *anglica* from Steephill on the Isle of Wight (Table 1, no. 12) (Fig. 6).

MIXED POPULATIONS

Data from four mixed populations some of which have intermediate plants are given in Table 1 and Fig. 5.

The populations at Braunton were quite variable and included individual plants which agreed well with *G. anglica* and *G. amarella*, but there was complete intergradation between them and with many intermediates (Fig. 5a). The populations at Beachy Head, Sussex were predominantly *G. anglica* and intermediates (Fig. 5b) but were not sampled later in the season. The Trottiscliffe, Kent population was similarly sampled only once but contained predominantly intermediate plants with a few which could be regarded as *G. anglica* (Fig. 5c). No intermediates were present at Banstead, Surrey where plants typical of good *G. anglica* and *G. amarella* occur (Fig. 5d).

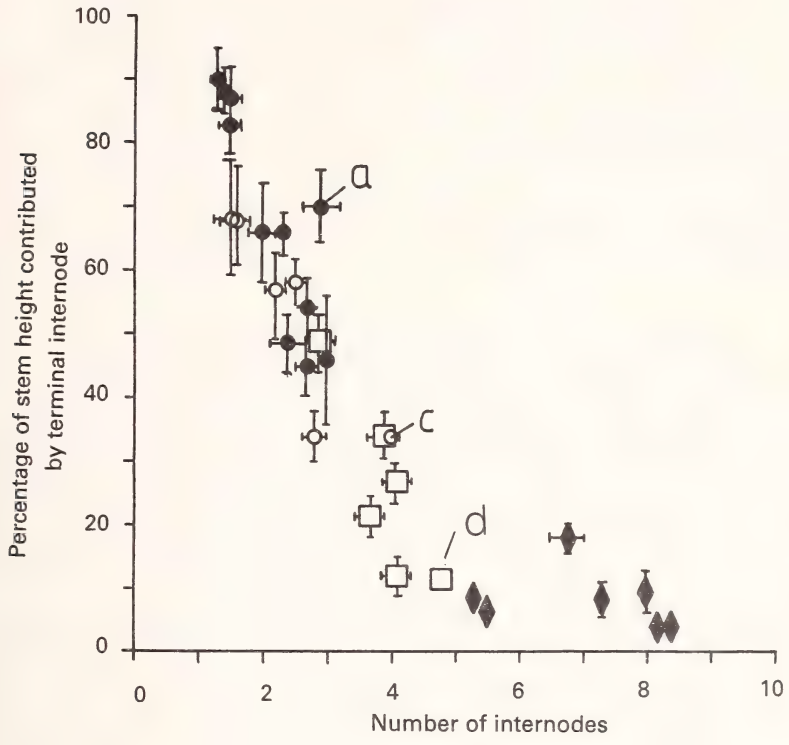


FIGURE 7. Number of internodes plotted against percentage of height contributed by the terminal internode to the height of the stem for populations of *Gentianella*. Points are population means and standard deviations (see Table 1). ○ *G. anglica* from Cornwall; ● *G. anglica* from elsewhere in Britain; ◆ *G. amarella*; □ intermediates between *G. anglica* and *G. amarella*; a, lectotype of *G. anglica*; c, holotype of subsp. *cornubiensis*; d, holotype of *G.* × *davidiana*.

The pattern of variation was similar in these populations to that observed near Perranporth (Fig. 3d).

DISCUSSION

GENTIANELLA ANGLICA

We agree with previous authors (Pugsley 1936; Pritchard 1959) that *Gentianella anglica* is a distinct species from *G. amarella*: plants which flower early have few internodes and an elongated terminal internode (Table 2).

Other authors have regarded *G. anglica* as an early-flowering form of *G. amarella* (e.g. McClintock 1972). Early-flowering forms of *G. campestris*, *G. germanica* and *G. uliginosa* have been noted (Briggs 1870; Trimen 1878; Zopfi 1991), and early-flowering plants could also occur occasionally in *G. amarella*. Indeed, one early-flowering plant of a *Gentianella* was found by E. Philp at Eccles, Kent in 1994 (Rich & Philp 1995); this had a contracted terminal internode, and could have simply been an odd *G. amarella*. Hence it cannot be assumed that all early-flowering plants are *G. anglica*. Seasonal-flowering variants of *G. amarella* are recorded for Europe by Pritchard & Tutin (1972) and Zopfi (1991) but have not been reported in Britain. Further investigation and observation of this phenomenon is required.

TABLE 2. CHARACTERS DISTINGUISHING *GENTIANELLA AMARELLA*, *G. ANGLICA* AND *G. × DAVIDIANA* (FIGURES ARE POPULATION MEANS)

	G. amarella	*G. × davidiana*	*G. anglica*
Number of internodes	5–11	3–5	0–3
Percentage of height contributed by terminal internode	1–20%	10%–40%	40–100%
Main flowering time	July–October	May–July (–? August)	March–July
Terminal pedicel	Short	Intermediate	Long

GENTIANELLA ANGLICA SUBSP. *CORNUBIENSIS* AND OTHER MIXED POPULATIONS

The investigations of Cornish and other populations has two main conclusions.

First, there is more variation present in Cornish populations than has previously been recognised. Some populations investigated in the field in 1995 are morphologically similar to *G. anglica* from other parts of England. It is therefore impossible to maintain the concept that the Cornish plants are morphologically and ecologically different or disjunct in distribution from other *G. anglica* populations. Surprisingly few sheets of typical, small plants of *G. anglica* from Cornwall have been seen in the limited number of herbarium collections available, but they are present. Collectors may have gathered the larger, more obvious, later-flowering plants; these are more likely to be hybrids and may not be representative of the populations as a whole. Pritchard (1959) appears to have investigated the specimens available but saw few plants in the wild.

Second, there are plants intermediate between *G. anglica* and *G. amarella* near Perranporth in Cornwall (the type locality of subsp. *cornubiensis*) and elsewhere in England. The simplest explanation of the intermediates is that they are hybrids between *G. anglica* and *G. amarella*. Some of these populations show continuous variation from one species to the other. Intermediate plants at Gear Sands near Perranporth in 1995 were highly fertile, and the populations show signs of introgression, a phenomenon also known in other *Gentianella* populations (Pritchard 1959, 1961).

Cornish plants may therefore either be *G. anglica* or the hybrid, and cannot be referred to a distinct subspecies. The type specimen of *G. anglica* subsp. *cornubiensis* is, with the exception of its long corolla which is not typical of Cornish plants, indistinguishable from other intermediates between *G. anglica* and *G. amarella* and is regarded by us as hybrid.

Given the importance of conservation of *G. anglica* and the need to distinguish between pure *G. anglica* and the hybrids, a name for the intermediates is desirable.

Gentianella amarella (L.) Boerner × **G. anglica** (Pugsley) E. F. Warb. = **G. × davidiana** T. C. G. Rich, **hybr. nov.**

HOLOTYPUS: The lower right hand specimen above the label is selected as the holotype on the sheet collected from St Boniface Downs, Isle of Wight (v.c. 10), 26 June 1925, *R. Melville* (**NMW**). The holotype has five internodes and the terminal internode contributes 34% to the height of the stem. The other eight specimens on the sheet show the typical range of variation present in mixed flowering populations.

SYNONYMS

Gentianella anglica (Pugsley) E. F. Warb. subsp. *cornubiensis* Pritchard (Pritchard 1959). *G. cornubiensis* (Pritchard) Pritchard (Pritchard 1972), **nomen. inval.**

DESCRIPTION

Hybrida fertilis inter *Gentianella amarella* (L.) Boerner et *G. anglica* (Pugsley) E. F. Warb. inter parentes media. Internodia 3–5. Internodium terminale c. 10–40% totius longitudinis caulis. Corolla (9·4–) 14–18 (–20) mm.

A fertile hybrid between *Gentianella amarella* and *G. anglica* intermediate between the parents. Internodes 3–5. Terminal internode forming c. 10–40% of total stem length. Corolla length of (9·4–) 14–18 (–20) mm.

Named in honour of R. (Dick) W. David (1912–93) who did much to champion the cause of plant conservation in Britain and botanised extensively in Cornwall for many years (Davies 1994).

DISTRIBUTION

Currently known only from England; see Fig. 8. V.c. 1, West Cornwall. Perranporth sand hills, 13 August 1915, *F. Rilstone* (**NMW**). Penhale Sands, huge hybrid swarm, 1966, L. J. Margetts (Margetts & David 1981). Gear Sands and Mount, 1995, T. C. G. Rich, D. T. Holyoak, C. French & R. J. Murphy. V.c. 4, North Devon. Braunton Burrows, 1986, L. J. Margetts & W. H. Tucker (Margetts 1987); 1995, T. C. G. Rich, P. A. Smith & J. Breeds. V.c. 10, Wight. St Boniface Downs, 26 June 1925, *R. Melville* (**NMW**). V.c. 14, East Sussex. Castle Hill N.N.R., 1994, T. C. G. Rich & S. A. Richardson. Beachy Head, 1995, T. C. G. Rich & P. G. Angold. V.c. 16, West Kent, Trottiscliffe, 1995, T. C. G. Rich & E. G. Philp.

In addition it is possible that plants at Stackpole, Pembrokeshire (v.c. 45) and Scottesthorpe Quarry, Lincolnshire (v.c. 53) are this hybrid but they require further investigation from a larger sample size than hitherto available.

TYPIFICATION OF *GENTIANA AMARELLA* L. VAR. *PRAECOX* TOWNSEND

The basionym for *Gentianella anglica* is *Gentiana amarella* var. *praecox* Townsend (1883) as described by Pritchard (1959).

Townsend (1883) cites a pre-Linnaean polynomial *Gentianella fugax verna seu praecox*, *Ray Synop.*, ed. 3, 275 (Ray 1724) as the source of his epithet var. *praecox*. This third edition of Ray's *Synopsis* was edited by J. Dillenius at Oxford. There are no specimens in **herb. Dillenius** at **OXF**, but there is a specimen in **herb. C. Du Bois** (also in **OXF**) labelled "*Gentianella fugax verna seu praecox* accepi a D. Fitz-Roberts" which corresponds to the reference of plants found by Fitz-Roberts near Kendal, Cumbria (Ray 1724) and which would probably have been seen by Dillenius; this specimen is *G. campestris* (L.) Boerner.

Townsend also cites four localities for his var. *praecox* on the Isle of Wight, and for one of them, Steephill, refers to specimens collected by F. Stratton, noting "I have lately received dried specimens in flower gathered May 27, 1878". Townsend's main herbarium is in **SLBI** with other parts in **K**, **OXF**, **NMW** and **WAR** (Kent & Allen 1984). There are no corresponding specimens in **SLBI**, **NMW** or **WAR** but **OXF** and **K** contain sheets collected by F. Stratton from Steephill on 27 May 1878. Stratton (1878) stated "I have dried a good number of specimens for distribution through the Botanical Exchange Club" and duplicates are also held in **BM** and **CGE** and possibly elsewhere.

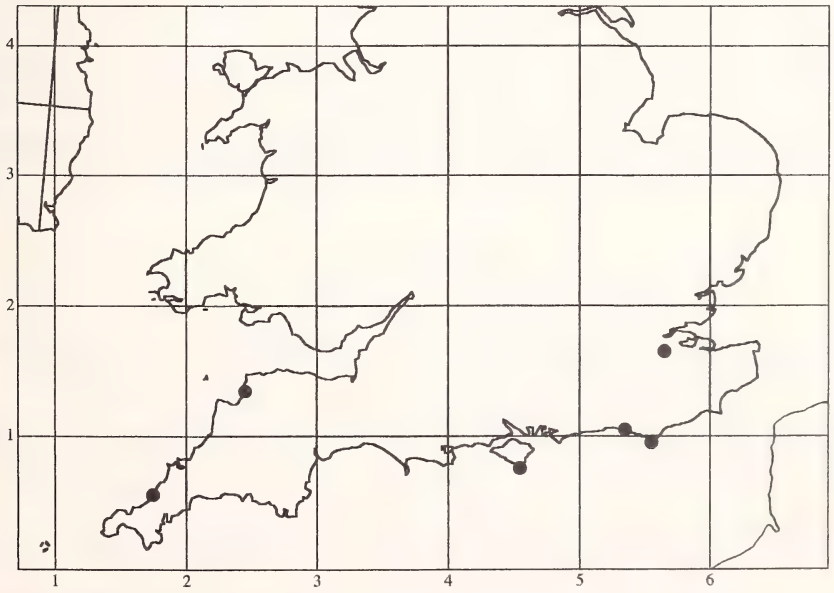


FIGURE 8. Distribution of *Gentianella* × *davidiana* in southern England.

A lectotype has been selected from the two sheets held in **OXF**. One has three specimens collected by Stratton on 27 May 1878 and two on 17 August 1878, but also has many specimens from different localities added by G. C. Druce; it is not clearly labelled and is rejected. The second sheet has eight specimens collected by Stratton on 27 May 1878, and five in fruit on 17 August 1878, and is more clearly labelled. The specimen on the left hand side immediately above the label numbered '163' in pencil by N. M. Pritchard is here selected as the lectotype of *Gentiana amarella* var. *praecox* Townsend (1883).

The lectotype is a typical example of *G. anglica* with a corolla 16 mm long, 3 internodes, a stem 37 mm tall and an upper internode 25 mm long forming 76% of the stem height.

IS HYBRIDISATION A THREAT TO CONSERVATION OF *G. ANGLICA*?

As hybridisation is believed to be responsible for the loss of range in *G. germanica* (Pritchard 1961) and the Bristol Channel race of *G. amarella* may indicate some past introgression from *G. uliginosa* (Pritchard 1959), hybridisation could also be a threat to survival of pure *G. anglica* colonies.

With the exception of some Cornish sites, all populations of *G. anglica* seen occur with *G. amarella*, either intermixed or nearby. Some populations observed in 1995 seem to be largely hybrid swarms (e.g. Trottiscliffe and Beachy Head). Typical *G. anglica* still occurs near Perranporth despite evidence from the herbarium specimens of hybridisation for nearly 100 years. Although there would seem to be considerable potential for hybridisation it has only been observed in a few populations to date. The species seem to be maintained as distinct by their different flowering times, despite the short period of overlap.

Thus the current evidence indicates hybridisation may be a threat to survival of some but not all populations of *G. anglica*. Further monitoring of the proportion of hybrids in populations and studies on the pollination ecology would be valuable.

ACKNOWLEDGMENTS

We would like to thank John Bailey, John Breeds, Jeremy Clitheroe, Gwynn Ellis, Lynne Farrell, Colin French, George Hutchinson, Quentin Kay, Mark and Claire Kitchen, Andrew Lack, Eric Philp, Joyce Smith, Paul Smith, Sue Telfer and Bill Tucker for their help and assistance. Duggie Kent has kindly advised on nomenclature. Bill Tucker provided the Latin description. Penny Angold provided comments on the manuscript.

We would like to thank the keepers of **BM**, **BRISTM**, **E**, **CGE**, **K**, **OXF**, **NMW**, **SLBI** and **WAR** for access to material and libraries for information. We are indebted to Serena Marner for help with typification of *Gentiana amarella* var. *praecox* Townsend.

This work was carried out on behalf of Plantlife. The work was partly funded by English Nature's Species Recovery programme and by Plantlife, with thanks to Roger Mitchell, Jane Smart and Miles King.

REFERENCES

Chatters, C. (1994). *Gentianella anglica* (Pugsley) E. Warb., in Stewart, A., Pearman, D. & Preston, C. D. *Scarce plants in Britain*, pp. 192–194. Joint Nature Conservation Committee, Peterborough.

Davies, L. A. (1994). *Dick David remembered by his friends*. L. A. Davies, Birmingham.

Kent, D. H. & Allen, D. E. (1984). *British and Irish herbaria*. B.S.B.I., London.

Margetts, L. J. (1987). 79th report on botany. *Report and transactions of the Devonshire Association for the Advancement of Science* **119**: 253–259.

Margetts, L. J. & David, R. W. (1981). *A review of the Cornish flora 1980*. Institute of Cornish Studies, Redruth.

McClintock, D. (1972). *Gentianella anglica*. *Bulletin of the Kent Field Club* **17**: 36–37.

Pritchard, N. M. (1959). *Gentianella* in Britain. I. *G. amarella*, *G. anglica* and *G. uliginosa*. *Watsonia* **4**: 169–193.

Pritchard, N. M. (1961). *Gentianella* in Britain. III. *Gentianella germanica* (Willd.) Börner. *Watsonia* **4**: 290–303.

PRITCHARD, N. M. (1972). Where have all the gentians gone? *Transactions of the Botanical Society of Edinburgh* **41**: 279–291.

PRITCHARD, N. M. & TUTIN, T. G. (1972). *Gentianella* Moench, in TUTIN, T. G. *et al.*, eds. *Flora Europaea* **3**: 63–67. Cambridge University Press, Cambridge.

PUGSLEY, H. W. (1936). *Gentianella amarella* in Britain. *Journal of botany* **74**: 163–169.

RAY, J. (1724). *Synopsis methodica stirpum Britannicarum*, 3rd ed. 1973 reprint. Ray Society, London.

RICH, T. C. G. (1993). *Early gentian* (Gentianella anglica) *and Broad-leaved cudweed* (Filago pyramidata) *on Banstead Downs, Surrey*. 'Back from the brink' project report no. 17. Plantlife, London.

RICH, T. C. G. (1994). *Clearance work on Bansted Downs, Surrey for Early gentian and Broad-leaved cudweed, January-February 1994*. 'Back from the brink' project report no. 24. Plantlife, London.

RICH, T. C. G. (1995a). *Report on Banstead Downs, Surrey for 1994*. 'Back from the brink' project report no. 54. Plantlife, London.

RICH, T. C. G. (1995b). *Report on Banstead Downs, Surrey for 1995*. 'Back from the brink' project report no. 60. August 1995. Plantlife, London.

RICH, T. C. G. (1995c). *Early Gentian* (Gentianella anglica) *in Sussex in 1994*. 'Back from the brink' project report no. 47. March 1995. Plantlife, London.

RICH, T. C. G., KITCHEN, M. A. R. & KITCHEN, C. (1995). *Early Gentian* (Gentianella anglica) *in Gloucestershire in 1994*. 'Back from the brink' project report no. 50. March 1995. Plantlife, London.

RICH, T. C. G., MURPHY, R. J. & MARGETTS, L. J. (1995). *The status of Cornish Early Gentian* (Gentianella anglica *subsp.* cornubiensis). 'Back from the brink' project report no. 51. April 1995. Plantlife, London.

RICH, T. C. G. & PHILP, E. G. (1995). *Early Gentian* (Gentianella anglica) *in Kent in 1994*. 'Back from the brink' project report no. 48. March 1995. Plantlife, London.

RICH, T. C. G. & WESTON, I. (1995). *Early Gentian* (Gentianella anglica) *in Lincolnshire in 1994*. 'Back from the brink' project report no. 49. March 1995. Plantlife, London.

STRATTON, F. (1878). On an Isle of Wight gentian. *Journal of botany* **16**: 263–265.

TELFER, S. M. (1994). *A survey of early gentian* (Gentianella anglica). The Isle of Wight. Unpublished report to English Nature. Wight Wildlife, Shanklin.

TELFER, S. M. (1995). *Early gentian Interim report '95*. Unpublished report to English Nature, Wight Wildlife, Shanklin.

TOWNSEND, F. (1863). *Flora of Hampshire*. Reeve, London.

TRIMEN, H. (1878). Note on the preceding communication. *Journal of botany* **16**: 265–266.

ZOPFI, H. J. (1991). Aestival and autumnal vicariads of *Gentianella* (Gentianaceae): a myth? *Plant systematics and evolution* **174**: 139–158.

(*Accepted January 1997*)

Scarce plants in Britain: have some been overlooked, and are others really Scarce?

T. C. G. RICH

67 Heol Uchaf, Rhiwbina, Cardiff, CF4 6SR

ABSTRACT

An analysis of the B.S.B.I. Monitoring Scheme data indicates that 40 plants not investigated for the Scarce Plants Project in Britain could potentially qualify as Scarce species, and their status should be investigated. One introduced species, and five species which do not qualify as Scarce on the basis of the post-1970 date class, should be deleted from the published list of Scarce species.

KEYWORDS: Scarce species, conservation, plant recording.

INTRODUCTION

The number of hectads (10-km × 10-km squares) recorded for each species in the *Atlas of the British flora* (Perring & Walters 1962) provides a measure of frequency which has been used to indicate which species are relatively common or rare. The data were subsequently used successfully to determine priorities for conservation (e.g. *Red data book* species, Perring & Farrell 1977; Scarce species, Nature Conservancy Council 1989) but the *Atlas of the British flora* is now out of date as an indicator of the status of the flora. Two large scale reviews have recently been carried out to provide up-to-date information (Rich & Woodruff 1990, 1996; Stewart *et al.* 1994), and an additional review of the *Red data book* species is currently in progress (Wigginton 1994).

The first of these reviews, the B.S.B.I. Monitoring Scheme (Rich & Woodruff 1990, 1996), was a sample hectad survey of Britain and Ireland during 1987 and 1988 which provided both a snapshot of the flora indicating the relative frequencies of plants in 1987–1988, and an indication of which species had changed in frequency since 1960. The survey showed that at least 24% of the flora had changed significantly in England, and at least 12% in Scotland (Rich & Woodruff 1996).

The second review was the Scarce Plants Project which ran from 1990 to 1993, recently published as *Scarce plants in Britain* (Stewart *et al.* 1994). 'Scarce' plants are defined as those which occur in 16–100 hectads in Britain, and data for the project were compiled from limited field work and a literature and herbarium review to establish those species which qualify as Scarce based on post-1970 records. *Scarce plants in Britain* includes information on all species investigated, including those occurring in more than 100 hectads though these do not qualify as Scarce species.

Unfortunately, species to be included in the Scarce Plants Project were mainly selected from the outdated maps of the *Atlas of the British flora*; Stewart *et al.* (1994) suggested that this reliance was "unavoidable" as the *Atlas* was the last "geographically comprehensive" survey of the British flora. Whilst it is true that the Monitoring Scheme was a sample rather than comprehensive survey, its results could have been related to Britain as a whole using standard statistical methods to provide a more up-to-date, rigorous selection of species to be investigated. Stewart *et al.* (1994) indicated that they had consulted the B.S.B.I. Monitoring Scheme by including "species which were shown to have suffered a marked decline . . ." but this review was carried out simply by looking at the maps for species with many pre-1987 records (A. Stewart, pers. comm. 1990); no systematic analysis was carried out, which resulted in selection of still-widespread species such as *Gnaphalium sylvaticum* and *Orchis morio* for investigation. Stewart *et al.* (1994) also suggested incorrectly that the Monitoring Scheme was "not designed to detect trends in relatively uncommon species"; the sample survey as designed should have detected trends in all species, though clearly not as sensitively as a more detailed study, and less accurately for relatively uncommon species.

This paper indicates those species not included in the Scarce Plants Project which are potentially Scarce based on the results of the Monitoring Scheme. First, the Monitoring Scheme frequencies are correlated against data given in Stewart *et al.* (1994) to demonstrate that the Monitoring Scheme data are a better predictor of Scarce species than the *Atlas of the British flora* data and should have been used to select the species for the Scarce Plants Project. Second, the expected national frequencies are predicted from the Monitoring Scheme data to indicate which species are likely to be Scarce. Third, the list of Scarce species of Stewart *et al.* (1994) is reviewed and suggestions made for revisions and future work.

Nomenclature and native status follow Stace (1991), with the exception of the status of *Barbarea stricta* (see Rich 1987).

METHODS

All species covered in the Scarce Plants Project were investigated except where data were incomplete or not comparable (e.g. introduced and native sites were not distinguished in the Monitoring Scheme data). Frequencies of species in the B.S.B.I. Monitoring Scheme period (1987–1988) were taken from Rich & Woodruff (1990). Frequencies of species for the *Atlas of the British flora* and the Scarce Plants Project were taken from Stewart *et al.* (1994).

Species which are potentially Scarce based on the B.S.B.I. Monitoring Scheme data were predicted from the tables in Rich & Woodruff (1990) as follows. Assuming that the probability of a species occurring is approximately constant throughout Britain, the number of hectads containing that species expected nationally (N) ± 95% confidence limits, based on the number of hectads in which the species was recorded in the Monitoring Scheme (M), is given by:

$$N = \frac{M \times 2860}{317} \pm 1{\cdot}96 \times 2860 \times \sqrt{\frac{1}{317} \times \frac{M}{317} \times \frac{1 - M}{317}}$$

where 317 is the total number of Monitoring Scheme sample hectads and 2860 is the number of hectads in Britain as a whole. Should the assumption of approximate constant occurrence not hold, because this is a sampling process for both widespread and restricted species, by chance some species with fewer occurrences will be over-represented and some species with more occurrences under-represented in the sample; the consequence is that a few extra species will be included using this method whilst a few others are missed.

Any species recorded in 19 or fewer Monitoring Scheme sample hectads is predicted to potentially occur in 100 or fewer hectads within the 95% confidence limits of the crude estimate of the number of hectads in which the species occurs nationally, and is hence potentially a Scarce species.

An initial list of all species occurring in 19 or fewer sample hectads was screened. *Red data book* species (Perring & Farrell 1977), species already noted as Scarce (Stewart *et al.* 1994), introduced species, taxa which have been taxonomically revised (e.g. *Odontites littoralis*, *Rumex tenuiflorus*) and species where under-recording is likely to have significantly under estimated their frequency (Rich & Woodruff 1990, 1996) were excluded. In addition, *Carex diandra* and *Draba incana* were also excluded as these are known to occur in more than 100 hectads (Stewart *et al.* 1994), as were seven species (*Baldellia ranunculoides*, *Cladium mariscus*, *Potamogeton alpinus*, *P. gramineus*, *P. lucens*, *P. obtusifolius* and *Ruppia maritima*) with reasonably up-to-date data (C. D. Preston, pers. comm. 1995). The current revision of the *Red data book* may also result in some species being regarded as Scarce rather than rare (e.g. *Leucojum aestivum*, *Poa infirma*, *Rorippa islandica*), but these are not discussed further here.

RESULTS

To test whether the sample Monitoring Scheme survey frequencies are a good predictor of whether plants are likely to be Scarce species, the number of sample hectad records in the Monitoring Scheme was correlated against the number of hectads compiled for the Scarce Plants Project for all species included in the latter project with comparable data, including species in more than 100 hectads (Fig. 1). A highly significant correlation coefficient ($r = 0{\cdot}804$ ($n = 257$, $p<0{\cdot}001$))

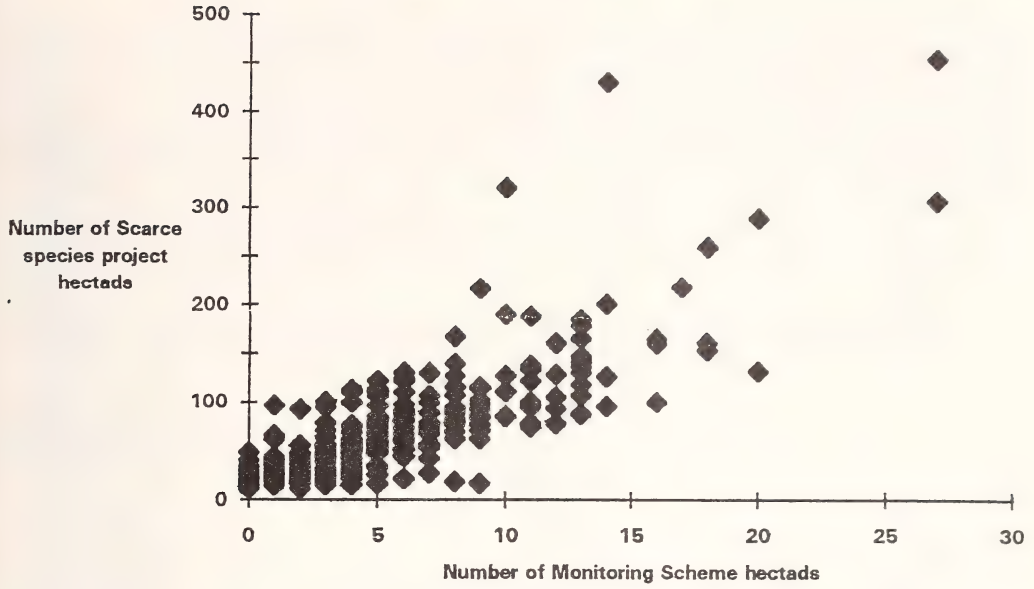


FIGURE 1. Relationship between number of sample hectads recorded for the B.S.B.I. Monitoring Scheme survey (Rich & Woodruff 1990) and total number of hectads for the Scarce Plants Project (Stewart *et al.* 1994) for all species with comparable data in both schemes (n = 257). The correlation coefficient of the line is r = 0·804 ($p<0·001$).

demonstrates that the Monitoring Scheme data provide a good indication of which plants might be Scarce species.

The correlation coefficient of the Scarce Plants Project frequencies with the *Atlas of the British flora* frequencies is r = 0·741 (n = 272; $p<0·001$). This lower correlation coefficient indicates that the Monitoring Scheme data provide a better indication of the status as Scarce species than the *Atlas of the British flora* data. For comparison, the correlation coefficient for the Monitoring Scheme frequencies with the *Atlas of the British flora* frequencies is r = 0·603 (n = 241; $p<0·001$). This indicates that the Monitoring Scheme frequencies shows less similarity with the *Atlas of the British flora* frequencies than with the Scarce Plants Project frequencies; this is as expected, since it is based on data collected over a shorter, more recent period of time and is based on a sample.

The 40 species which are potentially to be added to the list of Scarce plants based on the results of the B.S.B.I. Monitoring Scheme and using these methods are shown in Table 1. In addition, there is little information on *Utricularia intermedia* sensu stricto or *Utricularia stygia* to determine if these qualify as Scarce, *Red data book* or more common species. Critical taxa such as *Cochlearia alpina*, *Galium album* and *Rosa obtusifolia* also qualify for additional investigation but they are likely to be under-recorded.

DISCUSSION

The results show first, that the Monitoring Scheme data are a better predictor of Scarce status than the *Atlas of the British flora* data, and second, that an additional 40 species should be reviewed to see if they qualify as Scarce species. These species represent a 12% addition to the 325 species investigated by Stewart *et al.* (1994), but in view of the confidence limits given in Table 1 it is unlikely that many of them will qualify as Scarce.

The exclusion of two introduced species (*Briza minor* and *Poa palustris*) as Scarce species is welcome and objective, but the inclusion of another introduction *Brassica oleracea* following the argument that the introduced plants soon revert to 'wild' phenotypes is not accepted as the plants

are still introduced. Reversion to 'wild' phenotypes is well known in introduced crucifers such as *Matthiola incana* (Rich 1991), and probably occurs in many other garden plants too. If the argument for *Brassica oleracea* is accepted and applied consistently, many other obvious escapes from cultivation should be included in the Scarce or *Red data books*. For instance, wild-type *Lobularia maritima* is naturalised on one sea cliff in the Isle of Wight (Rich 1991) and would have to be treated as a *Red data book* species. Most of these escapes are rare simply because they rarely become naturalised, but are not of equivalent value for nature conservation to native, naturally Scarce or rare species.

Five species, *Centaurea cyanus*, *Euphorbia platyphyllos*, *Fumaria densiflora*, *Galeopsis angustifolia* and *Scandix pecten-veneris*, were included as Scarce by Stewart *et al.* (1994) as they were thought

TABLE 1. SPECIES WHICH MIGHT BE EXPECTED TO BE SCARCE BASED ON THE NUMBER OF SAMPLE HECTADS RECORDED IN THE B.S.B.I. MONITORING SCHEME (RICH & WOODRUFF 1990)

Species	Number of Monitoring Scheme sample hectads	Predicted number of squares nationally ± 95% confidence limits
Barbarea stricta	1	9±17·7
Utricularia ochroleuca	2	18±24·9
Callitriche brutia	3	27±30·5
Juncus ranarius	3	27±30·5
Salicornia fragilis	4	36±35·1
Utricularia australis	4	36±35·1
Equisetum hyemale	6	54±42·9
Monotropa hypopitys	6	54±42·9
Ophrys insectifera	7	63±46·3
Utricularia vulgaris s.s.	7	63±46·3
Anagallis minima	8	72±49·4
Cephalanthera damasonium	8	72±49·4
Hymenophyllum tunbrigense	8	72±49·4
Orobache elatior	8	72±49·4
Salicornia dolichostachya	8	72±49·4
Salicornia europaea	8	72±49·4
Helleborus viridus	9	81±52·3
Polystichum lonchitis	9	81±52·3
Astragalus glycyphyllos	10	90±55·0
Blysmus compressus	10	90±55·0
Epipactis purpurata	10	90±55·0
Juncus foliosus	10	90±55·0
Pseudorchis albida	10	90±55·0
Gnaphalium supinum	11	99±57·6
Agrostis curtisii	12	108±60·1
Calamagrostis canescens	12	108±60·1
Chenopodium murale	12	108±60·1
Euphrasia tetraquetra	12	108±60·1
Juncus triglumis	12	108±60·1
Salicornia ramosissima	12	108±60·1
Spiranthes spiralis	12	108±60·1
Astragalus danicus	13	117±62·4
Bromus lepidus	13	117±62·4
Colchicum autumnale	13	117±62·4
Cuscuta epithymum	13	117±62·4
Euphrasia anglica	13	117±62·4
Isolepis cernua	13	117±62·4
Loiseleuria procumbens	13	117±62·4
Luzula spicata	13	117±62·4
Nepeta cataria	13	117±62·4
Pyrola minor	13	117±62·4

TABLE 1. (continued)

Species	Number of Monitoring Scheme sample hectads	Predicted number of squares nationally ± 95% confidence limits
Bromus racemosus	14	126±64·7
Crepis biennis	14	126±64·7
Juncus compressus	14	126±64·7
Radiola linoides	14	126±64·7
Stellaria palustris	14	126±64·7
Geranium sanguineum	15	135±66·8
Neottia nidus-avis	15	135±66·8
Blysmus rufus	16	144±68·9
Cornus suecica	16	144±68·9
Epipactis palustris	16	144±68·9
Misopates orontium	16	144±68·9
Sambucus ebulus	16	144±68·9
Epilobium anagallidifolium	17	153±70·9
Juncus trifidus	17	153±70·9
Saussurea alpina	17	153±70·9
Wahlenbergia hederacea	17	153±70·9
Atropa belladonna	18	162±72·9
Phleum arenarium	18	162±72·9
Salix phylicifolia	18	162±72·9
Calystegia soldanella	19	171±74·7
Eryngium maritimum	19	171±74·7
Glaucium flavum	19	171±74·7
Silene acaulis	19	171±74·7
Spartina anglica	19	171±74·7
Vaccinium uliginosum	19	171±74·7

TABLE 2. NUMBER OF HECTAD RECORDS OF FIVE ARABLE WEEDS FOR DIFFERENT TIME PERIODS (DATA FROM STEWART *ET AL.* 1994)

Species	Number of hectads 1970–1993	Number of hectads 1980–1993	1980–1993 hectads as a percentage of 1970–1993 hectads
Centaurea cyanus	127	78	61·4%
Euphorbia platyphyllos	108	74	68·5%
Fumaria densiflora	161	89	55·3%
Galeopsis angustifolia	116	61	52·6%
Scandix pecten-veneris	131	85	64·9%
		Mean±s.e.	60·5%±2·6%

to be declining rapidly (*Euphorbia platyphyllos* and *Fumaria densiflora* were not found to have declined significantly by Rich & Woodruff 1990, 1996). These species had all been recorded in more than 100 hectads since 1970, but were included as Scarce on the basis that they occurred in less than 100 hectads since 1980. For arable weeds such as these whose appearance is unpredictable in time and space, the number of records is more a function of the effort put into recording them than their absolute frequency (e.g. Table 9 in Rich & Woodruff 1990). The time span over which records are collected would therefore be expected to markedly affect the number of records – for instance, twice the effort might be expected to produce twice the number of records as demonstrated by Rich & Smith (1996). If this is the case, assuming uniform recording effort, the number of records collected in the period 1980–1993 (14 years) might be expected to be 58.3% of the number of records collected in the period 1970–1993 (24 years). The mean number of records for the period 1980–1993 for these

five species in Stewart *et al.* (1994) is 60.5% of the number of records 1970–1993 (Table 2). This similarity in percentages suggests that the apparent rarity of these species is primarily a function of recording and these species should not be considered as Scarce. Alternatively, if the 1980 cut-off date was applied to other species which are no longer Scarce (e.g. *Myosurus minimus*), it is likely that many others would have been retained as Scarce species. The use of a cut-off date of post-1980 for some species and post-1970 for others is inconsistent and subjective.

Finally, it should be stressed that the number of hectads recorded for each plant is a *relative* measure of frequency and not an *absolute* one as the number of records largely depends on the effort put into collecting them (Rich & Woodruff 1990, 1992, 1996; Rich & Smith 1996). No botanical survey of the scale of the *Atlas of the British flora*, the B.S.B.I. Monitoring Scheme, the Scarce Plants Project or even any County Flora can be regarded as comprehensive as not all species within each hectad will have been recorded. As such, not too much reliance should be placed on whether a plant occurs in 100 hectads and qualifies as Scarce or 101 hectads and does not qualify without an independent measure of effort since effort markedly affects the number of hectads recorded. The variable effort put into recording selected species adopted by individuals for the Scarce Plants Project means that some species have been excluded simply due to more effort being put into recording them. For instance *Oenanthe fluviatilis* was researched in detail by M. J. Southam and is now no longer Scarce having been recorded in 114 hectads. In contrast, considerably less effort was put into recording *Myriophyllum verticillatum* which remains a Scarce species having been recorded in 100 hectads. This problem might be resolved if a measure of effort (e.g. time spent recording, recorder expertise) was collected for each species so that it was possible to compare relative frequencies. Alternatively, a better way to choose Scarce species would be to select, say, the rarest 5–10% of the species recorded from a standardised, uniform survey of all species in Britain which should then be independent of effort.

In conclusion, it is suggested that the status of the species in Table 1 should be investigated to determine whether they are Scarce or not; until that time the list of Scarce species in Stewart *et al.* (1994) should be regarded as provisional. It is also suggested that *Brassica oleracea*, *Centaurea cyanus*, *Euphorbia platyphyllos*, *Fumaria densiflora*, *Galeopsis angustifolia* and *Scandix pecten-veneris* should be deleted from the list of Scarce species.

ACKNOWLEDGMENTS

I would like to thank Paul A. Smith and David Roy for statistical advice, Chris Preston for details of post-1970 counts for aquatic species and correcting an error in the original manuscript, and Penny Angold for comments on the manuscript.

REFERENCES

Nature Conservancy Council (1989). *Guidelines for the selection of biological S.S.S.I.s.* N.C.C., Peterborough.

Perring, F. H. & Walters, S. M., eds. (1962). *Atlas of the British flora.* Thomas Nelson & Sons, Cambridge.

Perring, F. H. & Farrell, L. (1977). *British red data books: 1. Vascular plants.* Society for the Promotion of Nature Conservation, Lincoln.

Rich, T. C. G. (1987). The genus *Barbarea* R. Br. (Cruciferae) in Britain and Ireland. *Watsonia* **16**: 389–396.

Rich, T. C. G. (1991). *Crucifers of Great Britain and Ireland.* B.S.B.I. Handbook No. 6, B.S.B.I., London.

Rich, T. C. G. & Smith, P. A. (1996). Botanical recording, distribution maps and species frequency. *Watsonia* **21**: 161–173.

Rich, T. C. G. & Woodruff, E. R. (1990). *B.S.B.I. Monitoring Scheme 1987–1988.* Chief Scientist's Directorate Report no. 1265. Nature Conservancy Council, Peterborough.

Rich, T. C. G. & Woodruff, E. R. (1992). The influence of recording bias in botanical surveys: examples from the B.S.B.I. Monitoring Scheme 1987–1988. *Watsonia* **19**: 73–95.

Rich, T. C. G. & Woodruff, E. R. (1996). Changes in the floras of England and Scotland between 1930–1960 and 1987–1988: The B.S.B.I. Monitoring Scheme. *Biological conservation* **75**: 217–229.

STACE, C. A. (1991). *New Flora of the British Isles*. Cambridge University Press, Cambridge.
STEWART, A., PEARMAN, D. A. & PRESTON, C. D. (1994). *Scarce plants in Britain*. Joint Nature Conservation Committee, Peterborough.
WIGGINTON, M. J. (1994). Red Data Book project. *B.S.B.I. News* **67**: 39–40.

(*Accepted December 1996*)

Five new species of *Cotoneaster* Medik. (Rosaceae) naturalized in Britain

J. FRYER

Honeycritch Lane, Froxfield, Hampshire, GU32 1BE

and

B. HYLMÖ

Bygatan 30, S-267 40 Bjuv, Sweden

ABSTRACT

Of the 69 species of *Cotoneaster* so far found to be naturalized in the British Isles, the following five are here described by us as new species: **C. hsingshangensis**, **C. tengyuehensis**, **C. hummelii**, **C. pseudoambiguus** and **C. induratus**.

KEYWORDS: China, Denmark, Sweden, agamospecies, garden plants.

INTRODUCTION

The abundance of naturalized *Cotoneaster* species in the flora of Britain and Ireland is a remarkable and recent phenomenon, resulting from the increased popularity of this genus in gardens, the attractiveness of their fruit to birds, and the availability of suitable wild habitats. Although most of the naturalized plants occur in waste, derelict and marginal ground, many have invaded semi-natural habitats. It must be brought to notice though that many of these records are for single specimens only.

The increased incidence of this genus in the British Isles is illustrated by the fact that Dandy (1958) listed only five species, whilst Kent (1992) listed 45, in both cases including the single native *C. cambricus* J. Fryer & B. Hylmö (*C. integerrimus* Medik. var. *anglicus* Hrabětova). By September 1996 this total had risen to 69 (Stace 1997). It is likely that in the not too distant future more cultivated taxa will have been deposited by birds somewhere in the wild; currently more than 100 taxa are grown in gardens and this total is still rising. 69 taxa are keyed and the leaves of them illustrated by Stace (1997).

In common with related genera such as *Crataegus* and *Sorbus*, many taxa of *Cotoneaster* are apomictic. As a rule in *Cotoneaster* the diploids (2n = 34) are sexual and the polyploids (2n = 51, 68, 85, or 102) are apomictic. The sexual species are variable, often markedly so, whereas the apomictic species are almost invariable.

Of the 69 taxa now recognized as naturalized in the British Isles, five are hitherto un-named species. One species, *C. induratus*, has only recently been confirmed as being naturalized. We provide descriptions of all five here; in all cases we have been able to link the taxa with wild collections from China.

NEW SPECIES

Cotoneaster hsingshangensis J. Fryer & B. Hylmö, **sp. nov.**
Affinis *C. foveolato* Rehder & E. H. Wilson sed foliis atrovirentibus elliptico-ovatis, hypanthiis tubiformibus, pyrenis 2–3 (non 4–5) differt.
HOLOTYPUS: Cultivated in the botanic garden of Dr K. E. Flinck, Bjuv, Sweden. Plant no. *1027* ex Arnold Arboretum as *"C. foveolatus 13431–D SD China, Wilson 1907"*, 5 July 1964, *B. Hylmö* (**E**).

Paratypi: Cultivated in the botanic garden of Dr K. E. Flinck, Bjuv, Sweden, no. *9029*, 26 April 1957 & 26 June 1958, *B. Hylmö* (**BM**). Cultivated in the Botanic Garden of the University of Lund, Sweden, no. *9012*, 25 June 1958, *B. Hylmö* (**LD**). Cultivated in the garden of B. Hylmö, Bjuv, Sweden, no. *9142*, 19 October 1960, *B. Hylmö* (**LD**).

Erect and spreading, arching, multi-stemmed, deciduous shrub, 2–3 m; young growth spiralled or divaricate; young bark maroon-purple, pilose-tomentose; 1-year old bark blackish-maroon, becoming glabrous. Leaf blades on sterile shoots 75 × 40 to 105 × 50 mm, chartaceous or subcoriaceous, elliptic-ovate, with acuminate to acute apex and obtuse base; upper surface of newly emerged leaves intensely shiny maroon-purple to green, sparsely pilose, becoming dark green, persistently pilose, very bullate with 5–6 pairs of veins deeply impressed; lower surface light green, sparsely pilose becoming glabrous or nearly so; petiole 2–3 mm, pilose. Flowering shoots 25–40 mm, with 3–4 leaves; inflorescences erect with (3–)4–7(–9) flowers; peduncle 5–15 mm, pilose; pedicels 2–10 mm, pilose. Flowers 6–8 mm; hypanthium tubular, pilose-tomentose; calyx lobes obtuse, acute or cuspidate, glabrous or with a few hairs, with densely tomentose fringe; petals erect but incurved, leaving no opening at apex, pandurate, with red bases, maroon stripes and a few central red spots on outer side, margins irregularly toothed, white, inner sides of petals glabrous; stamens 16–20, incurved; filaments pale rose and white; anthers white; styles 2 or 3. Fruit globose, 10–11 mm, shiny plum-purple to black, pilose; calyx lobes depressed, glabrous, with tomentose margin forming star-shaped opening at apex; flesh yellowish; pyrenes 2 or 3, c. 6 mm long; styles attached 3/4 from base, reaching c. 1 mm above the pyrene.

Flowering in June, often re-flowering August-September. Fruiting September- October. Leaf-fall late October-November, with a green-yellow-red or intense red autumn colour.

Chromosome number 2n = 68 (Zeilinga 1964) as *C. moupinensis*, no. *1481* Botanic Garden Wageningen, 15 September 1964, *B. Hylmö* (**LD**).

This species has a tendency to burst into life in mild spells during January-February causing leaf bud damage which shows as whitish discoloured areas remaining throughout the season. This species has been widely cultivated in central and northern Europe. It can be seen in most botanic gardens and large private collections and has been distributed by nurseries under the name *C. foveolatus*, and more recently *C. foveolatus* 'Alnarps'. In the Arnold Arboretum, Massachusetts, USA, in 1958 a bush of the same taxon was named "*C. foveolatus* Wilson China 1907–13431D". This was Wilson no. *187* collected in W. Hupeh (Hubei), Hsing-Shan, thickets, alt. 1300–2000 m, 1907, bush 2– 3 m, seed only, as *C. foveolatus* (Rehder & Wilson 1912, p. 430).

Naturalized in S. Hampshire (v.c. 11), and Westmorland (v.c. 69).

Cotoneaster hummelii J. Fryer & B. Hylmö, **sp. nov.**

Affinis *C. villosulo* (Rehder & E. H. Wilson) Flinck & B. Hylmö sed foliis obovatis acuminatis, supra bullatis mox glabrescentibus, inflorescentiis 7–15 floribus differt.

Holotypus: Cultivated in Goteborg Botanic Garden, no. *9182*, Hummel, 1931 II, 461, 8 June 1960, *B. Hylmö* (**E**).

Paratypi: Cultivated in Göteborg Botanic Garden, no. *9182*, Hummel, 1931 II, 461, 21 October 1958, *B. Hylmö* (**E**). Cultivated in the garden of B. Hylmö, Bjuv, Sweden, seed from Göteborg, no. *9182*, 13 June 1964, *B. Hylmö* (**LD**).

Stiffly erect, multi-stemmed, deciduous shrub, 3–4 m; young growth spiralled; young bark greenish-yellow or light brown, pilose-tomentose, becoming glabrous. Leaf blades on sterile shoots 80 × 30 to 110 × 45 mm, chartaceous, somewhat wavy on margin, obovate, elliptic or ovate, with drawn out acuminate apex and cuneate base; upper surface of leaf on emergence shiny reddish-brown, densely pilose, becoming dark green, matt or somewhat glossy and glabrous, bullate, with 5–6 pairs of impressed veins; lower surface greyish-green to yellowish-brown, villous-tomentose becoming glabrous or nearly so; petiole 4–6 mm, villous. Flowering shoots 40–60 mm, with 4 leaves; inflorescence erect, with 7–15 flowers; peduncles 10–30 mm, sparsely pilose; pedicels 3–10 mm, sparsely pilose. Flowers 4–5 mm; hypanthium cupulate, sparsely villous with long yellowish hairs; calyx lobes triangular, acute, sparsely pilose with long hairs, fringed with dense yellowish villous hairs; petals erect but incurved leaving only small opening at apex, pandurate, reddish-brown with small black spots on outer side, margins toothed, white, petals glabrous within; stamens 16–20, incurved; filaments white with rose base, becoming red with age; anthers white; styles 2–3. Fruit obovoid, 11 × 10 to 13 × 12 mm, shiny plum-purple to black, glabrous, villous at apex; calyx lobes

depressed, sparsely villous, densely fringed with yellowish hair forming star-shaped opening at apex; flesh brownish, plum-purple when over-ripe; pyrenes 2 or 3 (3 in 80% of fruit), 5–6 mm long; styles attached c. 2/3 from base, not reaching above apex of pyrene.

Flowering in June, often re-flowering in August. Fruiting September-October. Leaf-fall late October-November after an intense maroon-purple autumn colour.

Chromosome number not known, but apparently apomictic.

Seed of this species was collected in the Min-Shan mountains of the province of Kansu (Gansu), China, in 1930 by the Swedish traveller Dr David Hummel. In the Botanic Garden of Göteborg in the autumn of 1958 the species was a striking 4 m high, many branched shrub weighed down with large clusters of shiny black fruit, and leaves with magnificent maroon-purple autumn colour. The shrub was said to be "*Cotoneaster moupinensis* vel sp. nov. Hummel 31 II 461". The seed was collected in Kansu, Min-Shan, Ngan-Dre-Liang on 31 October 1930. Later, the same taxon was observed in several gardens in Europe raised from seed distributed by the Göteborg Botanic Garden.

We name this species as a tribute to Dr David Hummel, 1893–1984, the medical doctor and naturalist of the Swedish Sven Hedin Expedition to Central China and the Gobi Desert, 1927–1931.

Naturalized in S. Hampshire (v.c. 11).

Cotoneaster pseudoambiguus J. Fryer & B. Hylmö, **sp. nov.**

Affinis *C. ambiguo* Rehder & E. H. Wilson sed ramis effusis arcuatis, foliis chartaceis late ellipticis vel rhombicis, supra bullatis persistenter pilosis, calycibus dentibus obtusis vel acutis differt.

Holotypus: Expedition to China 1907–09, Western Sichuan, west of Tachien-lu, alt. 3300 m, bush 6–8 ft [2–2.75 m], October 1908, *E. H. Wilson*, no. *1270* (**A**).

Paratypi: China, W. Szechuan (Sichuan), Tachien-lu, thickets, 8–9000 ft [2400–2700 m], June 1908, coll. *E. H. Wilson* no. *2178* (**A**). Cultivated Hort. Uppsala no. *9327* as *C. ambiguus*, ex Vilmorin, 20–23 October 1958, *B. Hylmö* (**BM**). Cultivated in the botanic garden of Alnarp, Sweden, no. *9279*, as *C. ambiguus*, 14 October 1958, *B. Hylmö* (**LD**).

Erect, multi-stemmed, spreading, arching, deciduous, 3–4 m shrub; young growth spiralled or divaricate; young bark brownish-red or light brown, pilose-tomentose; 1–year old bark brown, pilose. Leaf blades on sterile shoots 34 × 24 to 55 × 34 mm, chartaceous, broadly elliptic, broadly ovate or rhomboid, with acuminate (seldom acute) apex and cuneate base; upper surface of leaf on emergence reddish-green, densely villous, soon dark green, becoming sparsely hairy, matt, bullate; veins 4–5 pairs, impressed; lower surface pale green, at first densely villous, becoming sparsely so; petiole 3–4 mm, yellowish-villous. Flowering shoots 25–35 mm, with 4 leaves; inflorescences erect, with 4–7 flowers; peduncles 10–20 mm, yellowish-villous; pedicels 2–12 mm, yellowish-villous. Flowers 5 mm; hypanthium cupulate, yellowish-villous strigose; calyx lobes triangular, obtuse or acute, with few villous hairs, fringed yellowish-tomentose; petals erect but incurved leaving no opening at apex, pandurate, pale pink with red base on outer side, off-white and toothed at margin, petals glabrous within; stamens 15–20, incurved; filaments white and pale pink; anthers white; styles 2 or 3. Fruit globose or obovoid, 8 × 8 to 9 × 8 mm, shiny plum-purple to black, with few villous hairs; calyx lobes depressed, glabrous, leaving large opening at apex; flesh yellowish; pyrenes 2 or 3 (mostly 3), 5–6 mm long; styles attached c. 4/5 from base, exceeding the pyrene by c. 1 mm.

Flowering in June, sometimes re-flowering in September. Fruiting September- October. Leaf-fall October, with yellow autumn colour.

Chromosome number 2n = 68 (Zeilinga 1964), as *Cotoneaster ambiguus* Rehder & E. H. Wilson no. *1458*, cultivated Arboretum Wageningen, 22 May and 27 October 1964, *A. E. Zeilinga* (**LD**).

The holotype of *Cotoneaster ambiguus* Rehder & E. H. Wilson was collected in flower in June and therefore no seed was available. What is grown in nurseries and gardens today as *C. ambiguus* originated from another collection, namely *Wilson 1270*, an October collection with fruit. When describing *C. ambiguus*, Rehder & Wilson (1912) stated that "Numbers 1270 and 2178 differ from the type in their thicker, broader leaves. Number 2178 has a more numerous flowered corymb, broader sepals, showing some approach to *Cotoneaster moupinensis* Franchet". *Wilson 1270* and *2178* were both collected in the same area of the province of Sichuan around Tachien-lu (Kangting), and we now separate them as this new species *C. pseudoambiguus*. The type of *C. ambiguus* was collected in another area of the province of Sichuan, West of Kuan Hsein in Pan-lanshan.

Naturalized in Westmorland (v.c. 69).

When Rehder & Wilson (1912) described the extensive Wilson *Cotoneaster* collections from China, apomixis within the genus was not yet recognized. After studying earlier paratypes in cultivation the differences were evident, and it is preferred to separate those obligately apomictic taxa coming true from seed as distinct species.

C. hsingshangensis J. Fryer & B. Hylmö, *C. hummelii* J. Fryer & B. Hylmö and *C. pseudoambiguus* J. Fryer & B. Hylmö belong to Section *Cotoneaster*. Series *Lucidi* Pojark, which also includes three other species found naturalized in the British Isles: *C. laetevirens* (Rehder & E. H. Wilson) G. Klotz, *C. lucidus* Schltdl. and *C. villosulus* (Rehder & E. H. Wilson) Flinck & B. Hylmö. We provide here a key to all six species:

1. Inflorescence 5–15 flowered 2
1. Inflorescence 3–7(–9) flowered 3

2. Leaves with apex acute or acuminate; upper surface flat, intensely shiny; veins 3–4 pairs, only slightly impressed; shrub 1·5–2·5 m ..... *C. lucidus*
2. Leaves with apex elongated acuminate; upper surface bullate, dull; veins 5–6 pairs, impressed; shrub 3–4 m ..... *C. hummelii*

3. Leaves thin, membraneous to chartaceous, light-green; upper surface flat ..... *C. laetevirens*
3. Leaves subcoriaceous or chartaceous, dark-green; upper surface bullate 4

4. Leaves rhomboid or broadlly elliptic ..... *C. pseudoambiguus*
4. Leaves elliptic-ovate 5

5. Leaves very bullate; lower surface clear-green, shiny; calyx lobes glabrous or nearly so ..... *C. hsingshangensis*
5. Leaves only slightly bullate; lower surface pale-green, dull; calyx lobes villous-tomentose ..... *C. villosulus*

Cotoneaster tengyuehensis J. Fryer & B. Hylmö, **sp. nov.**

Affinis *C. glomerulato* W. W. Sm. sed foliis acuminatis, inflorescentiis 3–7 floribus, pyrenis 3–4 plerumque 4 differt.

Holotypus: Cultivated in the garden of B. Hylmö, Bjuv, Sweden, raised from seed ex Glasnevin Botanic Garden, Dublin, Ireland, as plant no. *9876 Cotoneaster* 'Tengyueh', 1 July 1974, *B. Hylmö* (**E**).

Paratypus: Glasnevin Botanic Garden, Dublin, Ireland, as plant no. *9876 Cotoneaster* 'Tengyueh', 10 September 1965, *B. Hylmö* (**BM**).

Recent collections: *C. tengyuehensis* has recently been re-found north of the city of Tengyueh by *K. Rushforth*, no. *2647* China, Yunnan, Nu Shan range, Ziben Shan, 12 km N. of Caojian, Mekong drainage, in cut-over forest in valley floor area, 2500 m, shrub 2 m, open habit, 1 November 1993. Also: *J. Fryer*, no. *FJWY 011* China, Yunnan, Mekong-Salween divide, Feng Shui Ling, 2500 m, 2 November 1996.

Stiffly erect, evergreen or semi-evergreen shrub, 2–2·5 m; branches arching; young growth distichous, persistently densely strigose; 1-year old branches greyish-dark- maroon, strigose. Leaf blades on sterile shoots 35 × 17 to 46 × 24 mm, chartaceous, ovate, with acuminate, mucronulate apex and obtuse base; upper surface somewhat shiny dark green, persistently pilose-strigose, veins 3–5 pairs, impressed; lower surface greyish-green, persistently villous; petiole 1–3 mm, strigose. Flowering shoots erect, 25–40 mm, with (3–)4 leaves; inflorescence a compact (3–)5–7(–9) flowered cyme; peduncle 1–4 mm, strigose; pedicels 1–3 mm, densely strigose. Flowers 5–6 mm; hypanthium cupulate, strigose; calyx lobes spreading, triangular, acuminate or cuspidate, strigose, with tomentose margin; petals erect, obovate, glabrous, dark maroon-red with somewhat frayed white margin; stamens c. 20, erect; filaments pale-pink; anthers white, becoming yellowish; styles 3–4 (–5). Fruit depressed-globose or obovoid, 7–9 mm, blood-red (when ripening green, yellow, orange to finally blood-red in the same cluster); calyx lobes erect; flesh yellowish; pyrenes 3–4 (mostly 4), seldom 5, 4–5 mm long; styles attached 2/3 from base.

Flowering late July. Fruiting October-November.

Chromosome number 2n = 68 (Krügel 1992) as *C.* 'New York', originating from B. Hylmö in 1967 number 79.

During the past 40 years we have studied *C. tengyuehensis* in gardens in Europe and the U.S.A. In most gardens the shrubs were without names or were named *C. franchetii* Bois, *C. wardii* W.W. Sm., *C. dielsianus* E. Pritz., *C. elegans* (Rehder & E. H. Wilson) Flinck & B. Hylmö or *C. cinerascens* (Rehder) Flinck & B. Hylmö. This taxon is easy to recognize and after some research we discovered its origin. The first clue was on a label in Glasnevin Botanic Garden, Dublin, Ireland, which simply read 'Tengyueh'. Tengyueh (or modern spelling Tenchong) is in the province of Yunnan, China. In the herbarium of cultivated plants of the Arnold Arboretum, U.S.A. (**AAH**), are a large number of sheets from Cotoneasters grown at Kew in 1923. Amongst those shrubs was our taxon, sown in the years 1914 and 1915. On one of the sheets was the number 12497. We found that George Forrest used numbers of this series during his expedition to China in 1912–1914.

Naturalized in W. Kent (v.c. 16).

Cotoneaster tengyuehensis J. Fryer & B. Hylmö belongs to Section *Cotoneaster*, Series *Glomerulati* Flinck & B. Hylmö.

Cotoneaster induratus J. Fryer & B. Hylmö, **sp. nov.**

Affinis *C. franchetii* Bois sed inflorescentiis foliosis 15–30 mm, 3–4 floribus, antheris albis (non lilacinis) differt.

Holotypus: China, N. W. Yunnan, on the N. W. flank of the Lichiang range, Lat. 27°20′N, Long. 100°10′E, 1200 ft [360 m], September 1922, *Forrest 22352* (**E**).

Paratypi: Cultivated in the Royal Botanic Gardens, Kew, as *Cotoneaster* 2235F: 422–22 Edinburgh, 24 September 1928 (**AAH**). Cultivated Hort. Bot. Berol. Dahlem Abteilung China no. 116, *Forrest 23*, 11 November 1948 (**E**). Cultivated in the garden of B. Hylmö, Bjuv, Sweden, no. *9424*, seed from Kew 1956 as 493–22 Edinburgh sp. 2235F, 26 July 1962 (**BM**), (**LD**).

Stiffly erect, deciduous or semi-evergreen shrub to 3 m ; branches erect; young growth distichous or spiralled, covered with dense tomentose hairs; 1-year old branches grey- tomentose. Leaf blades 19 × 10 to 27 × 14 mm, coriaceous, reticulate veined, ovate or ovate-elliptic, with acute or acuminate, mucronulate apex and cuneate base; upper surface shiny dark green, pilose-strigose; veins impressed, 3–4 pairs; lower surface with persistent, densely tomentose greyish-white hairs; petioles 2–3 mm, tomentose. Flowering shoots erect, 15–30 mm, with 4 leaves; inflorescence 3–5(–7) flowered, with an extended flowering period; peduncle 8–15 mm, silky tomentose; pedicels 1–4 mm, densely silky tomentose. Flowers c. 5 mm; hypanthium with dense silky hairs; calyx lobes erect, triangular, the outer ones with apex cuspidate, the inner ones acute or obtuse, with silky hairs, margins tomentose; petals obovate, glabrous, erect, leaving small opening at apex, reddish-maroon, pink and off-white at margin, irregularly toothed; stamens 20, erect; filaments subulate, broad-based, dark red or pink; anthers white; styles (2–)3(–4). Fruit obovoid or globose, 9 × 8 to 10 × 9 mm, shiny orange-red, pilose at apex; calyx lobes semi-erect, fringed tomentose; flesh yellowish; pyrenes 2– 4 (mostly 3), 5–6 mm long; styles attached 3/4 from base.

Flowering late in season – June and July. Fruiting November.

Chromosome number 2n = 68 (Zeilinga 1964), as *C. franchetii* cv. 'Gloire de Versailles', no. *935*. Proefstation, Boskoop, 27 October 1964, *A. E. Zeilinga* (**LD**).

Tracing the origin of *C. induratus* (as with many other species) involved a certain amount of detective work. In the Danish garden and nursery of Braendkjaerhoej of Kolding, South Jutland, a large number of new introductions, which included some of George Forrest's and Joseph Rock's Chinese *Cotoneaster* collections, was amassed before 1939. The extremely cold winters around that time killed a large number of the new introductions. However, some Cotoneasters withstood the very severe weather. The owner of the nursery, Mr Axel Olsen, realized that *C. induratus* would be of great value for Scandinavian gardens. He named it *Cotoneaster* cv. 'Hardy', and in several gardens it is to be found under this name. We have found this taxon wrongly named as *C. wardii*. In the Berlin Botanic Garden in 1948 a shrub labelled *C. wardii* was believed to be the Forrest collection no. 23. At Kew in 1956 there was a *Cotoneaster* labelled "493–22 Edinburgh sp. 2235 F". We believed this to be Forrest but the number 2235 was confusing as the Forrest collection 2235 proved not to be a *Cotoneaster*. Recently we discovered in the herbarium of the Arnold Arboretum, Harvard University, the solution to the puzzle. On 24 September 1928 a herbarium sheet was prepared of a shrub in Kew Gardens labelled "*Cotoneaster* 433–22 Edinburgh 22352F". Thus over the years one number had been lost in Kew and three in Berlin. In the herbarium of Edinburgh we were able to confirm that our *C. induratus* is the Forrest collection no. *22352*.

Found semi-wild in two localities: S. W. Yorks. (v.c. 63), and Midlothian (v.c. 83).

C. induratus J. Fryer & B. Hylmö belongs to Section *Cotoneaster*, Series *Dielsiani* Klotz which also includes four other species found naturalized in the British Isles: *C. dielsianus* E. Pritz., *C. sternianus* (Turrill) Boom, *C. insculptus* Diels, and *C. mairei* A. Lev. We provide here a key to all five species:

1. Fruit blood-red ..... *C. dielsianus*
1. Fruit orange-red 2

2. Flowering shoots 30–70 mm; inflorescence 7–15 flowered; leaves to 50 mm ..... *C. sternianus*
2. Flowering shoots 15–35 mm; inflorescence 1–7(–11) flowered; leaves to 40 mm 3

3. Leaves to 25 mm, broadly ovate or broadly elliptic, width/length ratio 0·7–0·8; inflorescences mostly 2–3 flowered ..... *C. insculptus*
3. Leaves ovate or elliptic, width/length ratio 0·4–0·6; inflorescences mostly 3–7 flowered 4

4. Leaves to 40 mm ..... *C. mairei*
4. Leaves mostly less than 25 mm ..... *C. induratus*

REFERENCES

Dandy, J. E. (1958). *List of vascular plants*. British Museum (Natural History) & Botanical Society of the British Isles, London.

Kent, D. H. (1992). *List of vascular plants in the British Isles*. Botanical Society of the British Isles, London.

Krügel, T. (1992). Zur zytologischen Struktur der Gattung *Cotoneaster* (Rosaceae, Maloideae) III. – *Beiträge zur Phytotaxonomie* **15**: 69–86. Jena.

Rehder, A. & Wilson, E. H. (1912). *Cotoneaster*, in Sargent, C. S. *Plantae Wilsonianae* **1**: 154–177. Cambridge, Massachusetts, U.S.A.

Stace, C. A. (1997). *New Flora of the British Isles*, 2nd ed. Cambridge University Press, Cambridge.

Zeilinga, A. E. (1964). Polyploidy in *Cotoneaster*. *Botaniska notiser* **117**: 262–276.

(*Accepted January 1997*)

Variation in some populations of *Calamagrostis stricta* (Timm) Koeler in the British Isles and the putative past hybridization with *C. canescens* (Wigg.) Roth

F. E. CRACKLES

143 Holmgarth Drive, Bellfield Avenue, Hull, HU8 9DX

ABSTRACT

The variability of *Calamagrostis stricta* (Timm) Koeler (Poaceae) at some sites in the British Isles has been investigated using hybrid index analysis and polygonal graphs. Most of the variation in *C. stricta* in the British Isles can be explained as the result of past hybridization with *Calamagrostis canescens* (Wigg.) Roth and subsequent backcrossing to *C. stricta*. Putative backcrosses occur in most English and Scottish *C. stricta* localities and signs of introgression are present in some Irish *C. stricta* plants, although *C. canescens* does not now occur in Ireland. The ecology and putative history of *C. stricta* in the British Isles, the conditions for hybridization with *C. canescens* and the likely roles of changing environment, hybridization and introgression in evolutionary change are discussed. A key to British *Calamagrostis* taxa based on the Leven, S.E. Yorks., v.c. 61, studies is presented.

KEYWORDS: Poaceae, variability, introgression, adaptation, (*C.* × *gracilescens*).

INTRODUCTION

Soon after the discovery in 1951 of the S.E. Yorks., v.c. 61, site for *Calamagrostis stricta* (Poaceae) my interest in its taxonomy was aroused by the realisation that *C. stricta* is a variable grass. Plants from well separated localities in the British Isles were said to show slight morphological differences (Hubbard 1968).

On a visit to Cranberry Rough, Great Hockham, W. Norfolk (v.c. 28) in July 1970 I found plants with long white hairs on the upper leaf surface and long ligules, features which on the basis of the Leven (v.c. 61) studies (Crackles 1994) are believed to be characteristic of *C. canescens* and not *C. stricta*. Also, shoots I collected from two English localities were found to have florets with a short awn leaving the lemma about half-way from its base. These characters are found in both Leven *C. canescens* × *C. stricta* (H_2, 2n = 28 and H_1, 2n = 56) (*C.* × *gracilescens*) populations and not in Leven *C. stricta* (Crackles 1994).

The relevant British literature was found to include not only the range of variation in *C. stricta* but also almost the full range of variation of *C. stricta* × *C. canescens* H_2 (2n = 28). The account of *C. stricta* in Hubbard (1968) was found to include almost the full range of variation found in the Leven *C. canescens* × *C. stricta*, H_2 (2n = 28) population, as well as in Leven *C. stricta* for some morphological characters, but not for all. Notably the panicle length is given as 7–20 cm long (Leven *C. stricta* panicle length (6–)9–13(–15) cm, Leven H_2 panicle length 13·7–19·2 cm, Leven H_1 (2n = 56) panicle length 13·5–20·8 cm); the basal branch of panicle as up to 6 cm (that of Leven *C. stricta* less than 4 cm, that of Leven H_2 (3·5–)4·6–7·4 cm and that of Leven H_1 3·8–6·6 cm) and the awn leaving the back of the lemma for one-third to half-way above the base (the awn of Leven *C. stricta* arises from one-third of the way up the lemma or below). This suggested that plants of hybrid origin had been named *C. stricta*. Further, Tutin (1987) gives the awn as arising from about the middle of the lemma as a diagnostic character of *C. stricta* while in the Leven studies this character proved to be consistent in the hybrids, both the H_2, 2n = 28 and the H_1, 2n = 56 (Crackles 1994) and not in *C. stricta*.

The taxonomy, biology, phytogeography and putative Quaternary history in the British Isles of *Calamagrostis stricta* are discussed in this paper. The opportunity is taken to assemble my thoughts on *Calamagrostis stricta*, its variability in the British Isles as revealed by the measurements of the

P.L.
P.Br.
G.L.
L.L.
A.L.
C.H.
Li.L.
A.I.
coll. F.E.C., 1970
A
B
C
D
E
F
G
H
I
J
K

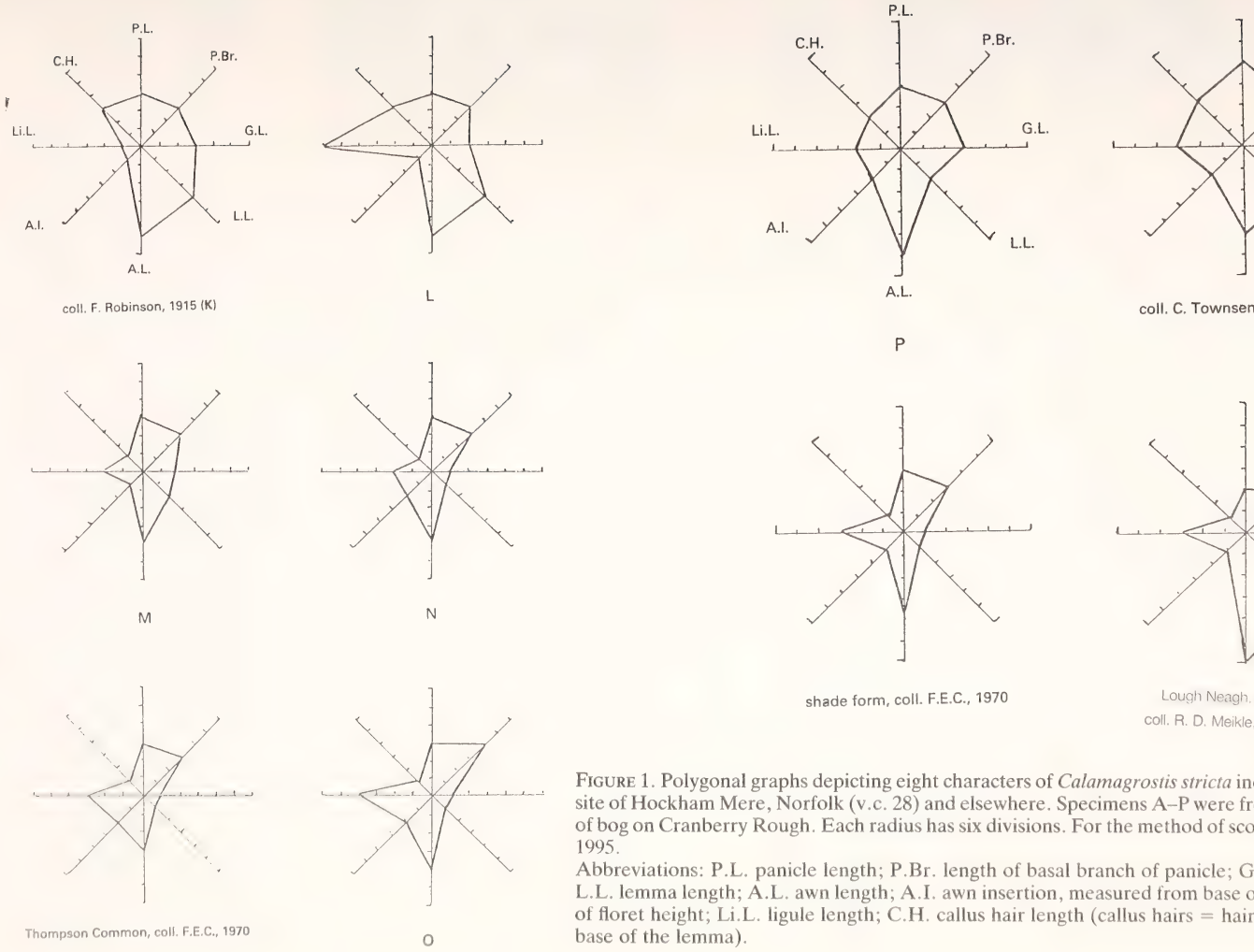


FIGURE 1. Polygonal graphs depicting eight characters of *Calamagrostis stricta* individuals from the site of Hockham Mere, Norfolk (v.c. 28) and elsewhere. Specimens A–P were from one small area of bog on Cranberry Rough. Each radius has six divisions. For the method of scoring see Crackles, 1995.

Abbreviations: P.L. panicle length; P.Br. length of basal branch of panicle; G.L. glume length; L.L. lemma length; A.L. awn length; A.I. awn insertion, measured from base of the floret as a % of floret height; Li.L. ligule length; C.H. callus hair length (callus hairs = hairs surrounding the base of the lemma).

Norfolk specimens and those from other localities as given in the "Results" and also the research carried out at the Leven Canal, S.E. Yorks. (v.c. 61) (Crackles 1994 & 1995).

A key to the *Calamagrostis* species, their hybrids and putative backcrosses is given at the end of the paper.

METHOD OF STUDY

During 1971, I was in regular correspondence with Dr C. E. Hubbard and in August of that year he collected a number of individual shoots of *C. stricta* from Cranberry Rough, W. Norfolk, (v.c. 28) from two populations, each about 20 m across in the same small area of bog. I spent a week in the Herbarium at Kew in August, 1971, when the specimens collected by Hubbard were examined. Measurements of five florets, removed at random, were recorded to provide average values as in the Leven studies (Crackles 1994). Each Norfolk variant was subject to hybrid index analysis based on the measurements of the Leven *Calamagrostis* populations (Crackles 1994) using the previous method of scoring (Crackles 1995).

Other *C. stricta* specimens in **K** and in the author's possession were examined and their parts measured as in the case of the Norfolk specimens already mentioned.

A polygonal graph using the same scheme as in the Leven studies (Crackles 1995) was constructed for each Norfolk variant collected by Hubbard and in **herb. F.E.C.** and in **K** (Fig. 1). This series of polygonal graphs are arranged to demonstrate most clearly the degree and nature of the difference between these taxa. They can also be compared with the polygonal graphs for Leven *C. stricta* and other Leven *Calamagrostis* populations (Fig. 2)

A polygonal graph is also presented for a specimen from Lough Neagh, Ireland (v.c. H39) (Fig. 1), for each specimen examined from Oakmere, Cheshire (v.c. 58) (Fig. 3) and Ashkirk Loch, Selkirkshire (v.c. 79), and for a specimen from Alemoor Loch, Roxburghshire (v.c. 80) (Fig. 4).

RESULTS

The 16 variants of *Calamagrostis stricta* collected by Dr C. E. Hubbard from a small area of Cranberry Rough, W. Norfolk, were found to resemble *C. stricta* generally, but to possess two or more characters of the Leven hybrid, *C. canescens* × *C. stricta* (H_2 population, 2n = 28) in various combinations. This is also true of most specimens from Cranberry Rough in **K** and in **herb. F.E.C.** In a few specimens a single putative hybrid character only was found; no specimen from this site exactly matched an individual of the Leven *C. stricta* population. By comparing the polygonal graphs for these specimens (Fig. 1) with that for Leven *C. stricta* (Fig. 2), most of these variants are seen to resemble Leven *C. stricta* with regard to ligule length, panicle length, glume length, lemma length, awn length and point of insertion of awn on lemma. Almost all the Norfolk variants resemble Leven *C. stricta* with regard to panicle and glume width. The length of the basal branch of the panicle is longer than in Leven *C. stricta*, but usually not markedly so. A character which frequently occurs in Norfolk *C. stricta* is white hairs on the upper leaf surface. This is a *C. canescens* character which commonly occurs in the Leven hybrids (Crackles 1994). The range of hybrid scores for the Norfolk variants examined is 2–9 (*C. stricta* = 0, *C. canescens* = 20, Leven H_2 population 8–14, Leven H_1 population 9–15).

I shall use the term partial hybrid to describe specimens which have characters of both Leven *C. stricta* and Leven hybrids.

Among partial hybrids from Cranberry Rough collected by me was the shade form of *C. stricta* (Fig. 1). Specimens I collected from Thompson Common, Stow Bedon, a site 3 km from Cranberry Rough, have awns of intermediate length which leave the lemma from about its mid point as in the Leven hybrids. A polygonal graph is given for one of these specimens (Fig. 1).

Of the Norfolk specimens examined, the one which has the most characters with measurements falling within the range of those found in the Leven *C. canescens* × *C. stricta*, H_2 population, is that collected by C. C. Townsend in **K**. The polygonal graph for this specimen (Fig. 1) shows similarities to that of the Leven H_2 population, although the specimen has some characters of Leven *C. stricta* including panicle width, ligule length, and length and width of glumes.

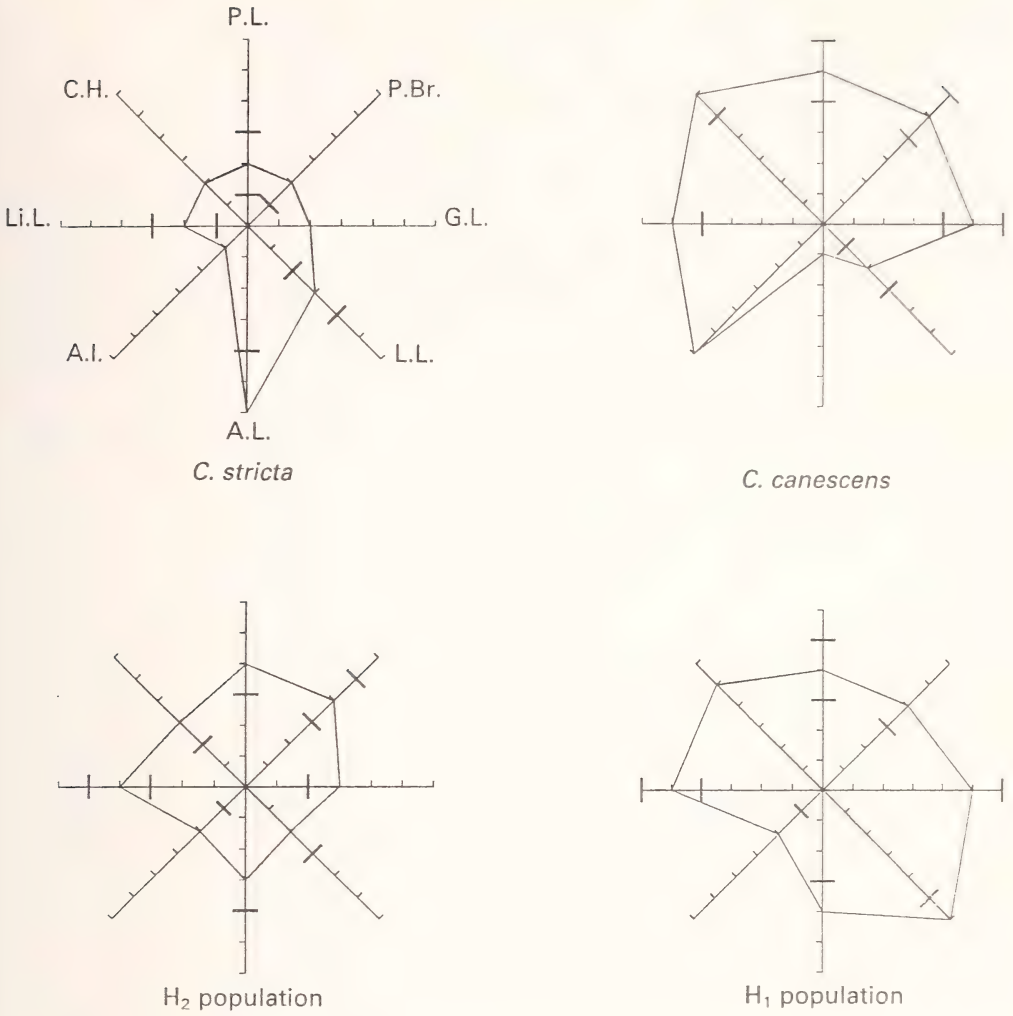
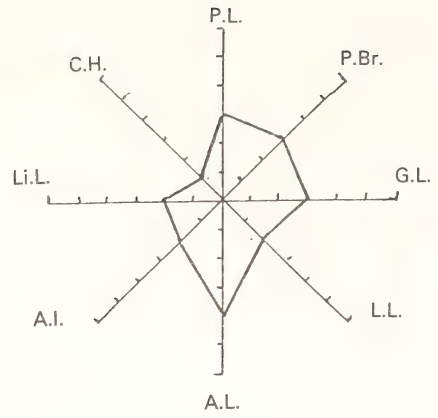


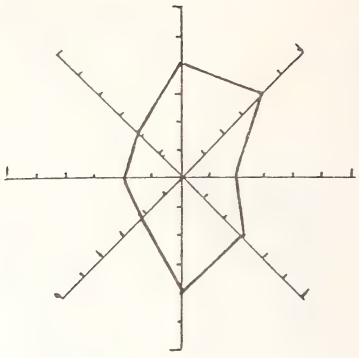
FIGURE 2. Variation in eight characters of Leven (v.c. 61) *Calamagrostis stricta*, *C. canescens* and *C. canescens* × *C. stricta*, 2n = 28 (H_2) and 2n = 56 (H_1) populations. Each radius has six divisions. For method of scoring see Crackles (1995). Each polygonal graph was drawn using the mean of measurements for each character of the population sample of 25 shoots; standard deviations are shown along each axis. Abbreviations are given under Fig. 1.

Some Norfolk variants of *C. stricta* have very short glumes, lemmas and callus hairs with measurements less than those found in Leven *C. stricta* or *C. canescens* × *C. stricta* populations (Figs 1 & 2). Two of these characters, i.e. short glumes and short lemmas, are found in the same four specimens, i.e. specimens N & O collected by Hubbard on Cranberry Rough (Fig. 1), a shade form collected there by the author (Fig. 1) and a specimen collected on Thompson Common (Fig. 1) and in no others.

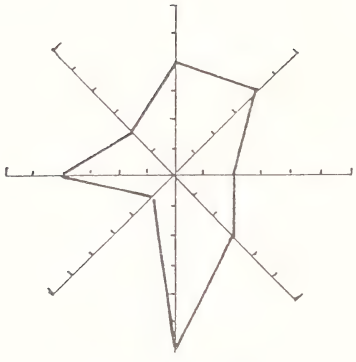
Characters of the Norfolk specimens with measurements not within the range of measurements for Leven *C. stricta* are usually within the range of measurements for the Leven H_2 population. Only rarely do measurements exceed those found in that population, i.e. the ligule length of specimens K & L (Figs 1 & 2), the panicle length of specimen F and the basal branch of panicle of specimen F



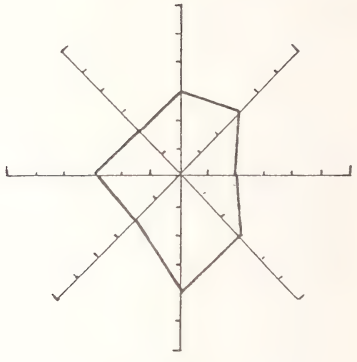
coll. G. Holt, 1893 (K)



coll. S. H. Bickham, 1878 (K)



coll. G. Last, 1940 (K)



coll. C. Waterfall, 1877 (K)

FIGURE 3. Polygonal graphs depicting eight characters of *Calamagrostis stricta* individuals from Oakmere, Cheshire (v.c. 58) collected at different times. Abbreviations are given under Fig. 1.

(Fig. 1). These measurements are in the range for the character concerned for the Leven H_1 population except for the length of the basal branch of panicle for specimen F which is in the *C. canescens* range for that character (Fig. 2).

Partial hybrids have been discovered among specimens from Oakmere, Cheshire (Fig. 3) and several Scottish sites including Alemoor Loch, Roxburghshire and Ashkirk Loch, Selkirkshire (Fig. 4); various combinations of putative hybrid characters are found in these specimens. The greatest variability has been found in the Cranberry Rough, Norfolk populations.

Some putative hybrid characters were found to occur more frequently than others in *C. stricta* British specimens examined. Characters occurring in the Leven H_2 range are (83 specimens examined): panicle length (31% of specimens), length of basal branch of panicle (42%), awn arising from near the middle of the lemma (35%) and hairs on upper leaf surface (55%). These same putative hybrid characters occurred in a higher percentage of specimens from the Norfolk sites (33

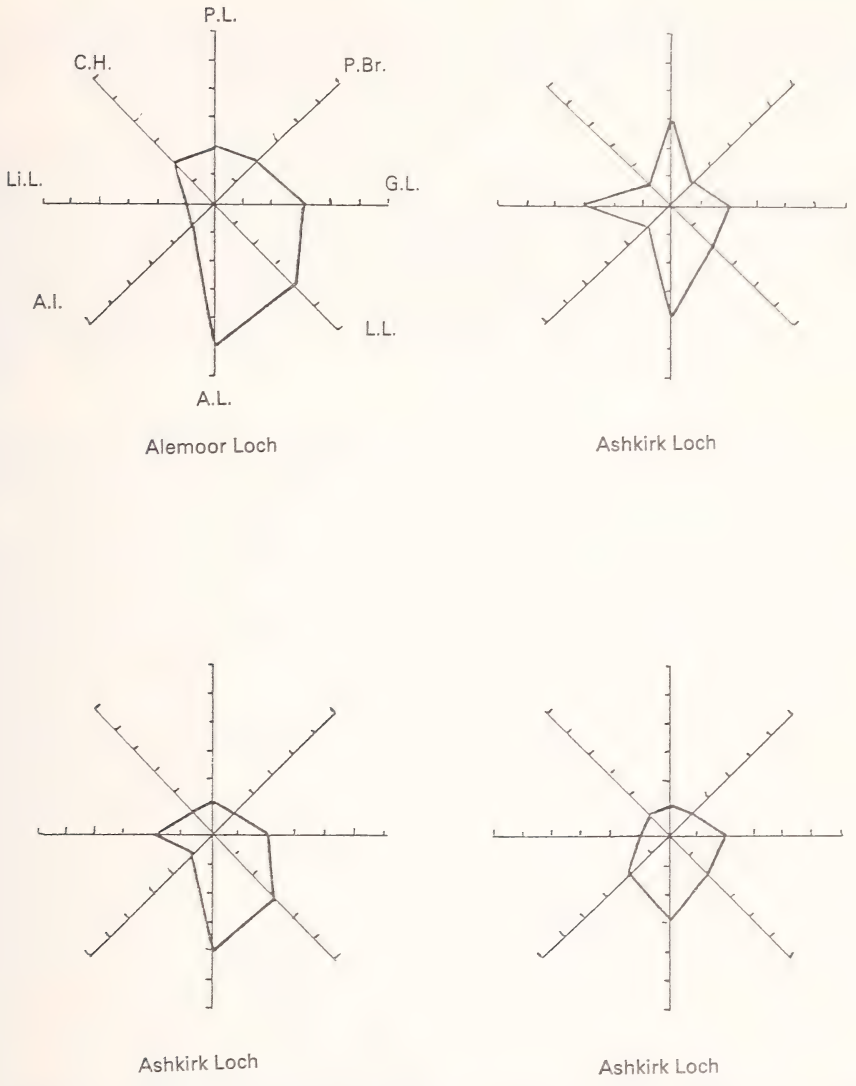


FIGURE 4. Polygonal graphs depicting eight characters of a *Calamagrostis stricta* individual from Alemoor Loch, Roxburghshire (v.c. 80) and of *C. stricta* individuals from Ashkirk Loch, Selkirkshire (v.c. 79). Specimens collected by H. Milne-Redhead, 1971, **herb F.E.C.**. Abbreviations are given under Fig. 1.

specimens examined): panicle length in the Leven H_2 range, 67%; length of basal branch of panicle, 74%; awn arising from near the middle of the lemma, 57% and hairs on upper leaf surface, 73%.

Intermediate awn length and awn arising from near the middle of the lemma often, but not invariably, occurred together. Both characters were found in specimens from Cranberry Rough and Thompson Common, Norfolk; Oakmere, Cheshire; Ashkirk Loch, Selkirkshire; Alemoor Loch, Roxburghshire and Loch Watten, Caithness (v.c. 109).

In some *C. stricta* specimens, a single putative hybrid character was found. The most frequent single putative hybrid characters found were hairs on the upper leaf surface and long basal branch of the panicle.

One or two putative hybrid characters were found in specimens from Lough Neagh, Ireland i.e. ligule length in the Leven H_2 range and/or white hairs on the upper leaf surface.

Specimens with all the characters of Leven *C. stricta* (Crackles 1994) have been found in the following localities: Malham, Mid-W. Yorks. (v.c. 64); Alemoor Loch, Roxburghshire; Bogton Loch, Ayrs. (v.c. 75); St John's Loch and Loch Scarmclett, Caithness (v.c. 109).

DISCUSSION

VARIATION IN *C. STRICTA* SENSU STRICTO AND *C. CANESCENS* SENSU STRICTO

The assumption is made that the range of variation in Leven *C. stricta* and *C. canescens* gives a reliable indication of variation usually found in populations of these species. In the case of the very variable British *C. stricta*, this assumption is based on an examination of Scandinavian literature (Crackles 1994) and of Swedish specimens possessed by the author. Leven *C. canescens* closely matches the description of this species in British literature (Hubbard 1968; Tutin 1987; Rose 1989; Stace 1991).

VARIATION IN *C. STRICTA* SENSU LATO

Most of the variation in *C. stricta* is most satisfactorily explained by postulating that there has been past hybridization between *C. canescens* and *C. stricta* and subsequent backcrossing of the F_1 and later generations to *C. stricta*, a different combination of hybrid characters occurring in different backcrosses.

Beds of *C. canescens* and of *C. stricta*, the latter showing only slight signs of hybridity, occur side-by-side on Cranberry Rough, Norfolk, the site of Hockham Mere, but no intermediates possessing all the characters of the Leven hybrids were found. The specimen in **K** collected by Townsend approaches the Leven hybrid, population H_2 ($2n = 28$). It has a number of characters of the hybrid, but some characters of Leven *C. stricta* as specified in the results section and would seem to be best regarded as part of the Norfolk series of backcrosses.

The fact that the shade form of *C. stricta* (var. *viridis*) from Cranberry Rough is one of the putative backcrosses is of great interest. Apart from this rare form, *C. stricta* only occurs in unshaded situations whereas *C. canescens* is notably shade tolerant so that it appears that *C. stricta* var. *viridis* may have inherited its shade tolerance from *C. canescens*. I have also examined two specimens of the shade form from Loch Watten, Caithness (v.c. 109), 1907, *C. Druce* (**K**). Both specimens are partial hybrids, one with an awn of intermediate length and awn position, the other with just an intermediate awn position on the lemma.

Variants of *C. stricta* which are satisfactorily explained as products of hybridization with *C. canescens* and subsequent backcrossing have been found among specimens from most of the British localities from which the species has been recorded. Variants with different hybrid characters have been collected from a single locality, notably from Cranberry Rough, Norfolk, and from Oakmere, Cheshire.

The short glumes, florets and callus hairs of some Norfolk *C. stricta*, outside the range of variation for these characters in any of the Leven *Calamagrostis* populations, may be explicable as a result of the long isolation of the populations concerned and the opportunity for mutations to have occurred. Some diminution of parts is a possible result of hybridization resulting in negative heterosis (Stace 1975).

Some specimens of *C. stricta* from Cranberry Rough, Norfolk, and other British localities show only slight morphological signs of hybridity. The single character of the Leven hybrids most commonly found in putative introgressants is long white hairs on the upper leaf surface, a *C. canescens* character (Crackles 1994; Nygren 1946). Such slight signs of hybridity are satisfactorily explained as the result of repeated backcrossing from *C. canescens* × *C. stricta* i.e. by introgression. During introgression, there is gradual infiltration of genes from one species to another. Anderson (1949) pointed out that this process may continue until the introgressant is morphologically indistinguishable from the pure species. There are specimens from a number of British stations which answer to the description of *C. stricta* sensu stricto as understood by the Leven studies; these may or may not be introgressed.

It seems desirable to regard the putative backcrosses from *C. canescens* × *C. stricta* to *C. stricta* as variants of *C. stricta*, particularly when the number of hybrid characters is small. If this policy is adopted, the question arises as to where the line should be drawn between *C. stricta* variants and the

hybrid. For example should the Townsend specimen, which shows a number of hybrid characters, be regarded as a *C. stricta* variant or as *C. canescens* × *C. stricta*? The specimen would seem to be best regarded as part of the Norfolk series of backcrosses. In any study relating to the evolution of *C. stricta*, *C. canescens* and their hybrid derivatives, it is desirable to distinguish between:

1. *C. stricta* where introgression cannot be demonstrated;
2. backcrosses in which hybrid characters found in the Leven H_1 or H_2 populations occur, but some characters found in Leven *C. stricta* persist;
3. *C. canescens* × *C. stricta* (2n = 56), Leven H_1 population; and
4. *C. canescens* × *C. stricta* (2n = 28), Leven H_2 population (Crackles 1994).

Localities from which *C. stricta* is recorded, but where *C. stricta* sensu stricto specimens, as understood by the Leven studies, have not been found, need to be searched for pure *C. stricta*. There may have been a tendency to select specimens of hybrid origin because of their larger panicles.

DISTRIBUTION OF *C. STRICTA* AND *C. CANESCENS*; THE HISTORY OF *C. STRICTA* IN VARIOUS LOCALITIES

The discontinuous distribution of *C. stricta* in the British Isles becomes meaningful if regarded as a relict distribution of a species once widespread. Influenced by the writing of Pigott & Walters (1954) and Rose (1957), I put forward the theory that this sub-arctic grass has been in the British Isles since the Late Glacial (Crackles 1968). As the ice retreated, great floods of melt water formed extensive lakes and marshes on lower ground, such as occur today between the mountains of Scandinavia, so that suitable habitats for *C. stricta* would abound. At Leven, *C. stricta* occurs at the edge of the canal and I believe *C. stricta* sensu stricto to be primarily a species of lake edges in fenland areas. As the climate became warmer and extensive afforestation and acid peat formation followed, the species would be obliterated from most localities and in time extensive drainage would cause a further reduction in its distribution. It would persist in those few places where environmental conditions remained favourable to the species. I suggested that the low-lying area of the Leven Carrs with its meres was one of these (Crackles 1968).

C. stricta is more or less circumpolar in Arctic and sub-arctic regions (Polunin 1959); it is found in Greenland and Spitsbergen (Nygren 1946) and is common in northern Norway and Sweden, Finland, Estonia, Latvia, Lithuania and Poland. It also occurs in northern Russia and Siberia (Hultén 1950). It occurs in scattered localities in southern Norway and Sweden, Denmark and islands in the Baltic; it is rare with a disjunct distribution in central Europe, including the British Isles (Tutin 1962) (Fig. 5). It is classified by Matthews (1955) as Northern Montane i.e. a species with its main centre of distribution in northern Europe, but reappearing further south in Europe, usually only in montane areas. *C. stricta* is an exceptional member of the group in remaining a lowland species at the southern edge of its range.

The present distribution of *C. stricta* in the British Isles may be related to winter temperatures. Most localities are in the north or east of Great Britain where the lowest mean February temperatures are recorded (Perring & Walters 1962). It occurs in Ireland, but only in the north and it may be limited by the 2·2°C February isotherm.

Rose (1957) points to evidence that highly calcareous water seeping steadily through the ground is inimical to the growth of coarse mesotrophic vegetation so that succession to woodland is indefinitely suppressed. At Leven, extensive annual flooding of the carrland, which still occurred in winter until c. 40 years ago, could have prevented the formation of woodland, at any one time, over at least part of the area. It is also worthy of note that most of the English sites for *C. stricta* are spring-fed and Rose (1957) remarked that "such spring-fed habitats may have remained permanently open since Late Glacial times". There is a spring in the Leven Canal, the ripples from which reach the bank where a *Phragmites australis* (Cav.) Trin. ex Steudel bed ends and a bed of *C. stricta* begins. Cranberry Rough, in the parishes of Great Hockham and Stow Bedon, Norfolk, is on the site of Hockham Mere and there are still springs in the area, but no permanent standing water. At Malham Tarn, Yorks., GR SE/88.67, *C. stricta* occurs at the junction of the two inflow streams as they enter the tarn, an area subject to flooding when the spring-fed streams are in spate. At Oakmere, Cheshire, GR SK/57.68, *C. stricta* occurs at the edge of the lake which is spring-fed (Lind 1949) "in places subject to periodic inundation" (Lind 1951).

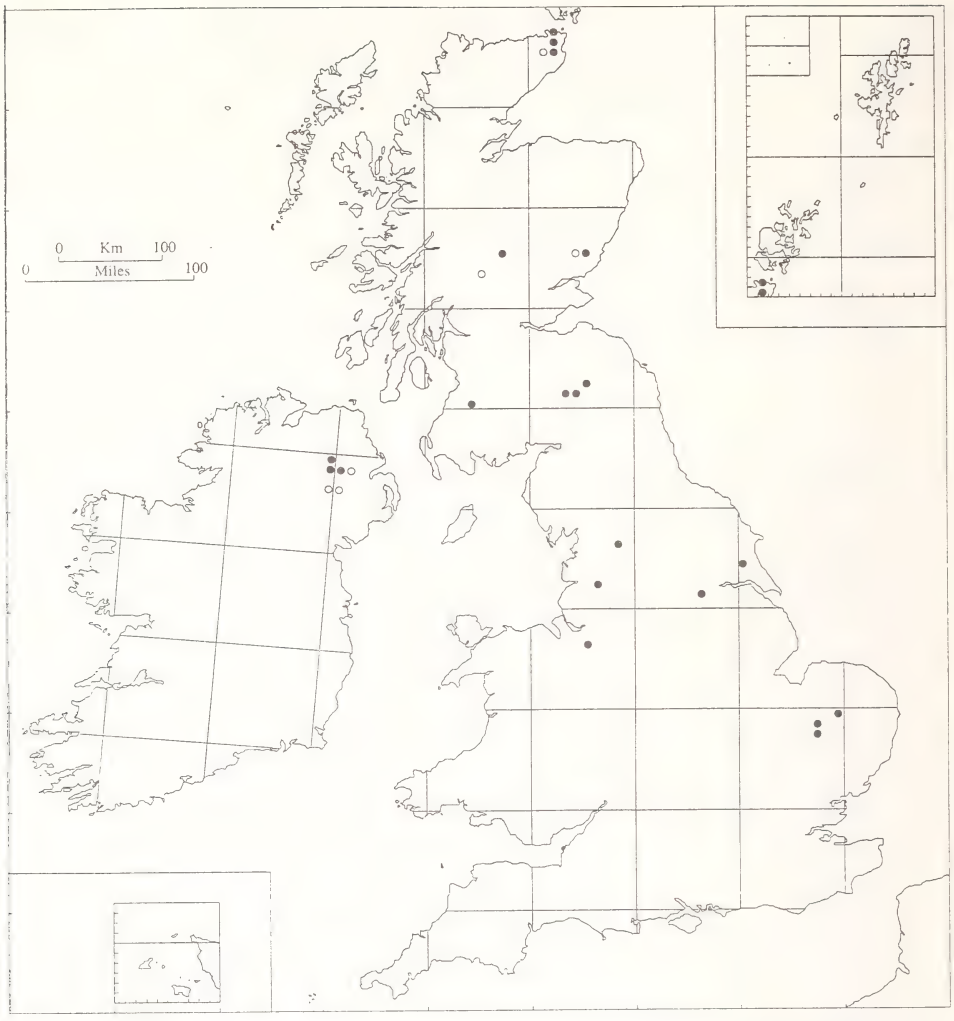


FIGURE 5. Distribution of *Calamagrostis stricta* in the British Isles, on a 10-km square basis. ● post-1950 record, ○ pre-1950 record.

Calamagrostis canescens is classified by Matthews (1955) as belonging to the European Continental Element i.e. species characteristic of central Europe, thinning out westwards. It is believed to have spread into the British Isles as the climate became warmer, but while the British Isles were still attached to the continent. It occurs in central and northern Europe, southwards to northern Spain, northern Italy and Bulgaria and also in western Siberia (Tutin 1962). Hultén (1950) in his distribution map shows that it is fairly common in parts of southern Sweden, locally frequent in Denmark and in parts of central Russia and southern Finland as well as in Latvia and Lithuania and that there are scattered localities in western Norway, parts of Sweden, in Estonia and on islands in the Baltic Sea.

C. canescens occurs in marshes, fens and wet open woodland, here and there in the lowlands of England to the Border (Hubbard 1968), mainly in the east (Perring & Walters 1962); it is rare in Scotland and absent from Ireland (Rose 1989) (Fig. 6).

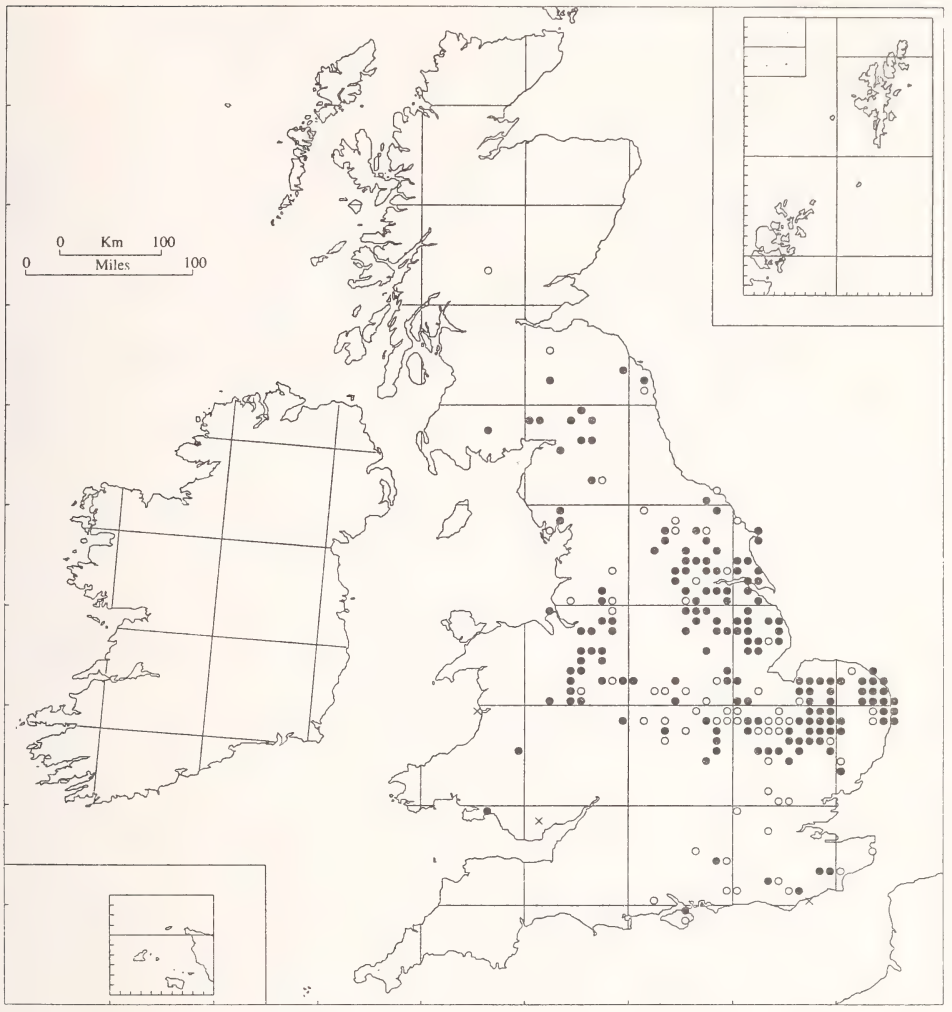


FIGURE 6. Distribution of *Calamagrostis canescens* in the British Isles, on a 10-km square basis. ● post-1950 record, ○ pre-1950 record.

CONDITIONS FOR HYBRIDIZATION BETWEEN *C. STRICTA* AND *C. CANESCENS*

I have previously given an account of the area in which Leven Canal, GR TA/056.449 – 108.449, is situated and its history. Map evidence suggests that the canal, cut in 1802, passed through two meres or their sites, including the edge of one where I first found *C. stricta*. I also listed the scarce and local British species recorded for the canal and its banks, the occurrence of which strongly supports the view that the canal and its banks derived their flora from the former meres and adjacent marshes (Crackles 1994). The meres in Leven Carrs were still present at least towards the end of the eighteenth century and were finally drained soon after the publication of the drainage plan of 1831 (Page 1831).

I believe that *C. stricta* which grows at the edge of the canal formerly grew at the margin of one or more meres in Leven Carrs, while *C. canescens* would grow in large beds in adjacent marshes, as it does today at Pulfin Bog by the River Hull, less than 2 km south of the canal and by Hornsea Mere, GR TA/18.46. The construction of the canal and its banks brought the two species close together so enabling hybridization to occur. *C. canescens* grows in quantity on the canal bank, particularly on its

top and outer slope. Anderson (1949) stated that "hybridization of the habitat" is necessary before the establishment of hybrid populations becomes possible. The sloping bank adjacent to the water provides a suitable intermediate habitat for the H_1 population, while the H_2 population grows at the canal edge where competition is at a minimum.

C. canescens and *C. stricta* are both tetraploids with 2n = 28. No sterility or internal crossing barriers appear to exist between *Calamagrostis* tetraploids (Nygren 1946). *C. canescens* and *C. stricta* are maintained as separate entities and hybridization prevented by differences in distribution, different ecological requirements and differences in flowering times. Historical factors may have operated to alter the distribution of the species; there may have been barriers to spread or extinction of one or both species from localities where they formerly occurred.

The flowering times of *C. stricta* and *C. canescens* growing by Leven Canal, S.E. Yorks., were studied. *C. stricta* is usually in full flower by mid-June, while *C. canescens* is not normally in full flower until the first week in July. There may be a slight overlap of flowering times, a few spikes of *C. stricta* being still open when the first spikes of *C. canescens* are also open. When the early part of the summer is cold, flowering of *C. stricta* may be delayed by as much as ten days. In some years, tightening of the spikes of *C. stricta* is delayed so that only some spikes are in the closed condition by the first week in July. In both these situations, there may be a significant overlap of flowering of the two species (Crackles 1994).

The occurrence of several different *C. stricta* variants, believed to be backcrosses from *C. canescens* × *C. stricta* to *C. stricta*, on Cranberry Rough, Norfolk, on the site of Hockham Mere, GR TL/92.93, many close together in a small area, points to the existence of F_1 hybrids on this site in comparatively recent times. Godwin & Tallantire (1951) stated that Hockham Mere was a lake of 750 acres [303·5 ha] in Tudor times, that it was not known when it was drained, but that there were indications that it was overgrown by 1737. It is probable that during the period of drainage suitable intermediate habitats for F_1 and F_2 hybrids occurred. Eventually, natural selection has apparently favoured the survival of a range of backcrosses and it seems that a number of different microhabitats still exist on the Hockham Mere site where the different backcrosses can still thrive. Stace (1975) points out that the significance of "hybridized habitats" becomes much more important in the F_2 and later generations, where the range of variation and therefore ecological requirements are so much greater.

C. stricta spread from the Hockham Mere site to the nearby Thompson Common, GR TL/93.96, between 1955 and 1970 (E. L. Swann, in litt. 18 February 1970). It occurs by the side of a pond and shows little variation.

The occurrence of different partial hybrids in other parts of the British Isles suggests that F_1 and F_2 hybrids once occurred in these localities also. Past hybridization and backcrossing to *C. stricta* and stabilization of the taxa may have occurred a very long time ago, particularly in areas where *C. canescens* is now absent.

In recent times, the two species were known to occur on the same site only in three British localities: Leven, S.E. Yorks (v.c. 61); Thorne, S.W. Yorks. (v.c. 63) and Cranberry Rough, W. Norfolk (v.c. 28).

C. canescens is rare in Scotland. There are post-1950 records for Dumfriesshire (v.c. 72) (Plant records, *Watsonia* **17**: 197); Kirkcudbrightshire (v.c. 73) (Stace 1991); Peeblesshire (v.c. 78) (Biological Records Centre) and Roxburghshire (v.c. 80) (Plant records, *Watsonia* **13**: 143). The scattered occurrence of partial hybrids in Scotland suggests that *C. canescens* was once more widespread there. It is of interest in this connection that Nygren (1946) states that the overlap of distribution of *C. canescens* and *C. stricta* in Scandinavia was once much greater than it is today suggesting that the hybrid *C. canescens* × *C. stricta* is now far more widely spread there than *C. canescens*.

It is of interest that some of the Irish specimens of *C. stricta* show signs of introgression, these signs of hybridity being slight in the specimens I have examined. *C. canescens* has not been recorded for Ireland. It may be that *C. canescens* did once occur in Ireland or that the hybridization and subsequent backcrossing which gave rise to the *C. stricta* variants occurred before Ireland was cut off from the rest of the British Isles.

The evidence suggests that infiltration of genes from *C. canescens* may have played an important part in the survival of *C. stricta* in the British Isles, near the edge of its climatic range, as well as making possible adaptation to changed environmental conditions, e.g. drier conditions and shade.

The perennial nature of *Calamagrostis* taxa is important, enabling beds of hybrids to provide gene pools derived from both species for considerable periods of time.

WHY DOES BACKCROSSING TAKE PLACE MAINLY TO *C. STRICTA* AND NOT *C. CANESCENS* AND WHY DO SUCH BACKCROSSES SURVIVE?

The question arises as to why backcrossing appears to be almost always to *C. stricta* and not to *C. canescens*. The flowering time of the F_1 hybrid (2n = 28) is usually intermediate between that of the two parents, although I have seen it in flower at Leven at the same time as *C. canescens*. However, in years in which flowering or closing of the spikes of *C. stricta* is significantly delayed the chance of backcrossing to *C. stricta* rather than to *C. canescens* is greatly increased.

C. stricta and *C. canescens* have very different ecological requirements. *C. stricta* sensu stricto characteristically occurs by open water whereas *C. canescens* occurs often some distance from the water's edge in areas subject to winter flooding but dry in summer. Hybridization has probably only occurred when there have been changes which have brought populations of the two species close together. The reason for the tendency for *C. stricta* backcrosses to survive and *C. canescens* to disappear from mixed populations is likely to be complex and to involve both environmental and climatic factors and their interaction. Also the explanation may be different in different parts of the British Isles. As changes occurred which favoured the survival of *C. stricta* backcrosses, suitable habitats for *C. canescens* may have been lost. The fact that *C. canescens* was once more widely distributed at the northern edge of its range in Scotland and in Scandinavia suggests that a minimum winter temperature, higher than that required for *C. stricta* may have been vital for the survival of *C. canescens*. Further studies of populations of *C. stricta*, including backcrosses, and of *C. canescens* and their requirements, particularly in Scotland and the study of the history of localities where *C. stricta* backcrosses occur may help to answer these questions.

The following key is provided to encourage other field workers to engage in the study of this particularly interesting group of plants.

KEY TO THE SPECIES OF *CALAMAGROSTIS* AND THEIR HYBRIDS

1. Hairs at base of lemma longer than lemma 2
1. Hairs at base of lemma shorter than or ± equal to the lemma 4
2. Leaves hairless; hairs at base of lemma >1·5 × as long as lemma ..... *C. epigejos*
2. Leaves hairy on upper surface; hairs at base of lemma <1·5 × as long as lemma 3
3. Ligules 2–6 mm; anthers purple, dehiscent, pollen well formed ..... *C. canescens* i*
3. Ligules 7–10(–13) mm; anthers yellow, indehiscent, pollen absent ..... *C. purpurea* ii*
4. Hairs markedly < lemma; awn arising from one-quarter to one-third above the base of the lemma; no hairs on upper leaf surface 5
4. Hairs usually ± equalling the lemma; awn arising from one-third to half-way above the base of the lemma; usually white hairs on upper leaf surface 6
5. Spikelets 3–4 mm; lower glume acute; one or more lower leaf sheaths usually hairy; culm usually rough near panicle ..... *C. stricta* iii*
5. Spikelets 4·5–6·0 mm; lower glume acuminate; leaf sheaths glabrous; culms smooth.. *C. scotica*
6. Glumes 3·5–4·2 mm long and 0·8–0·9 mm wide; callus hairs mainly slightly < floret; anthers yellow when exserted; pollen 0; tightened panicle after flowering slightly wider than that of *C. stricta* ..... *C. canescens* × *C. stricta*, 2n = 28 (Leven H_2)
6. Glumes 4·9–5·9 mm long and 1·0–1·2 mm wide; callus hairs mainly equal to floret; or slightly > floret; anthers purple; pollen well formed; tightened panicle after flowering twice as wide as that of *C. stricta*. ..... *C. canescens* × *C. stricta*, 2n = 56 (Leven H_1)

i* Backcrosses from *C. canescens* × *C. stricta* to *C. canescens* may have culm rough near panicle; panicle not lax as in *C. canescens* sensu stricto, not nodding after flowering; awn arising >0·3 mm below tip of lemma; glumes variable in length in one panicle.

ii* *C. purpurea* in the British Isles is described as having hairs on upper leaf surface (Stace 1991; Stewart 1988). However, note that Nygren (1946) considered lack of hairs on upper leaf surface to be a significant character of this species which he used to distinguish it from *C. canescens*.

iii* Backcrosses from *C. canescens* × *C. stricta* to *C. stricta* generally resemble *C. stricta* but have one or more hybrid characters, e.g. white hairs on the upper leaf surface as in *C. canescens*; ligule > 3·0 mm; panicle >15 cm; basal branch of panicle >4 cm; glumes >4 mm; callus hairs ± equalling the lemma; awn arising from one-third to half-way above the base of the lemma.

ACKNOWLEDGMENTS

The work described in this paper formed part of a thesis accepted for the degree of M.Sc. at the University of Hull. I am indebted to the late Dr C. E. Hubbard for his interest in my research and for collecting material from Cranberry Rough, Norfolk; also to the late Mr E. L. Swann for accompanying me to the Norfolk sites and providing site information and to Dr R. W. M. Corner, Dr H. Milne-Redhead and Dr D. W. Shimwell for providing material from other sites. I am grateful to Mr Peter Green and other members of staff of the Royal Botanic Gardens, Kew for making facilities and herbarium material available; also to Mrs J. Croft and C. D. Preston for producing the maps and providing records of *C. canescens* for Scotland. Thanks are also due to Professor C. A. Stace for reading the manuscript and making helpful suggestions.

REFERENCES

Anderson, E. (1949). *Introgressive hybridization*. Wiley, New York.

Crackles, F. E. (1968). Some plant associations of the River Hull valley. *East Yorkshire field studies* **1**: 13–24.

Crackles, F. E. (1994). *Calamagrostis stricta* (Timm) Koeler, *C. canescens* (Wigg.) Roth and their hybrids in S.E. Yorks, v.c. 61, northern England. *Watsonia* **20**: 51–60.

Crackles, F. E. (1995). A graphical analysis of the characters of *Calamagrostis stricta* (Timm) Koeler, *C. canescens* (Wigg.) Roth and their hybrid populations in S.E. Yorks, v.c. 61, northern England. *Watsonia* **20**: 397–404.

Godwin, H. & Tallantire, P. A. (1951). Studies in the post glacial history of British vegetation, XII, Hockham Mere, Norfolk. *Journal of ecology* **39**: 285–307.

Hubbard, C. E. (1968). *Grasses*, 2nd ed. Penguin Books, Harmondsworth.

Hultén, E. (1950). *Atlas of the distribution of vascular plants in N.W. Europe*. Generalstabens Litografiska anstalts förlag, Stockholm.

Lind, E. M. (1949). The history and vegetation of Cheshire meres. *Memoirs and proceedings of the Manchester Literary and Philosophical Society* **90**: 1–20.

Lind, E. M. (1951). Notes on the natural history of Oakmere, Cheshire (1) Vegetation of the exposed shore. *Memoirs and proceedings of the Manchester Literary and Philosophical Society* **92**: 1–11.

Matthews, J. R. (1955). *Origin and distribution of the British flora*. Hutchinson, London.

Nygren, A. (1946). The genesis of some Scandinavian species of *Calamagrostis*. *Hereditas* **32**: 131–262.

Page, E. (1831). *The report of Mr Edward Page upon the better drainage of the land within the level of Holderness drainage*. Unpublished report, Beverley. [Copy in Hull local history library.]

Perring, F. H. & Walters, S. M., eds. (1962). *Atlas of the British flora*. Nelson, London.

Pigott, C. D. & Walters, S. M. (1954). On the interpretation of discontinuous distribution shown by certain British species of open habitats. *Journal of ecology* **42**: 95–116.

Polunin, N. (1959). *Circumpolar arctic flora*. Oxford University Press, Oxford.

Rose, F. (1957). The importance of the study of disjunct distributions to progress in understanding the British flora. *Botanical Society of the British Isles. Conference reports* **5**: 61–67.

Rose, F. (1989). *Colour identification guide to the grasses, sedges, rushes and ferns of the British Isles and north-western Europe*. Viking, London.

Stace, C. A. (1975). *Hybridization and the flora of the British Isles*. Academic Press, London.

Stace, C. A. (1991). *New Flora of the British Isles*. Cambridge University Press, Cambridge.

Stewart, O. (1988). *Calamagrostis* Adanson in Rich, T. C. G. & Rich, M. D. B., eds. *Plant crib*, pp. 135–136. B.S.B.I., London.

Tutin, T. G. (1962). *Calamagrostis* Adanson in Clapham, A. R., Tutin, T. G. & Warburg, E. F., eds. *Flora of the British Isles*, 2nd ed., pp. 1170–1171. Cambridge University Press, Cambridge.

Tutin, T. G. (1987). *Calamagrostis* Adanson in Clapham, A. R., Tutin, T. G. & Moore, D. M., eds. *Flora of the British Isles*, 3rd ed., pp. 643–644. Cambridge University Press, Cambridge.

(*Accepted January 1997*)

Rubus L. (Rosaceae) in the Isles of Scilly: a revised list

D. E. ALLEN

Lesney Cottage, Middle Road, Winchester, Hampshire, SO22 5EJ

ABSTRACT

As a result of fieldwork in 1995, only one of the six species recorded under *Rubus fruticosus* agg. in J. E. Lousley's standard *Flora of the Isles of Scilly* (1971) has been confirmed. The archipelago is now shown to possess at least 13 named taxa and five unnamed ones, exclusive of recent hybrids. *R. iricus* Rogers, present in four of the largest islands and locally abundant in two, is new to Britain, being previously known only in Ireland and Alderney, Channel Islands. Though only 45 km to the south-west of the mainland, the islands lack several species characteristic of the west of mainland Cornwall, but have two in relatively much greater quantity than there.

KEYWORDS: Cornwall, brambles, diversity, dispersal.

INTRODUCTION

In his *Flora of the Isles of Scilly* Lousley (1971) listed six species under *Rubus fruticosus* agg. (Rosaceae). As that is only one more than the number reported by Townsend (1864), the only person known to have collected material of this group from Scilly at any earlier period, it might be assumed that Lousley's total is an exhaustive one, given the many years he devoted to investigating the vascular flora of this archipelago. However, study of his list and of specimens of his in herbaria suggests that he ignored the group almost entirely – a surprising fact in view of his keen interest and expertise in the no less difficult genus *Hieracium* as well as his known acquaintance with F. Rilstone, whose knowledge of *Rubus* in mainland Cornwall was well-known at the time to be both extensive and authoritative (but who is believed never to have visited Scilly).

A comparatively cursory inspection of the group that I made while holidaying on the two largest islands in 1975 was sufficient to show that a greater number of species were in fact present (some of them subsequently reported in Margetts & David 1981), and that the *Rubus* flora was not necessarily a mere impoverished version of that of the nearest mainland (Allen 1977). A more intensive exploration seemed likely to be productive, but it was not until 1995 that a return visit for that purpose was achieved, when in the course of two weeks all the inhabited islands were worked with a reasonable degree of thoroughness. The resulting collection has been deposited in **BM**.

1995 DISCOVERIES

Following the 1995 fieldwork, it has turned out that of the six species listed by Lousley (1971) only the ubiquitous *R. ulmifolius* Schott was determined correctly for certain. The late B. A. Miles, who examined material for at least three different collectors, probably hazarded names against his better judgement, conscious of his unfamiliarity with the Cornubian *Rubus* florula, which, as he was well aware, is substantially different from that of most of the rest of Britain. Two other contemporary specialists had no more success with specimens each was sent.

Disregarding putative recent hybrids (of which numerous examples were encountered, usually as isolated bushes or patches, though in one case in quantity along two opposite hedgebanks), 18 taxa were detected in all on this occasion, 13 of them named species. In the list that follows the islands are indicated by the respective distinguishing letters employed in Lousley's *Flora* (M: St Mary's, A: St Agnes, T: Tresco, B: Bryher, MN: St Martin's) and cited in the same order as in that work, clockwise from St Mary's.

R. mollissimus Rogers Relatively much more plentiful than in mainland Cornwall. M: E. coast from Pelistry Bay to Porth Hellick, at intervals, among bracken, in places in quantity; also one bush on Garrison Hill crest. T: four scattered bushes on Middle Down and a further one on Abbey Hill. The flowers, normally pink in this species, are uniformly whitish in Scilly, perhaps in response to the high actinic content of the sunlight for which these islands are noted.

R. viridescens (Rogers) T. A. W. Davis M: Lower Moors, a single clump by the path through the open marshland.

R. daveyi Rilstone M: common. A: abundant among low bracken along the inner edge of Wingletang Down, but only one or two bushes elsewhere in hedges (perhaps gull-dispersed, for the sole clump on adjoining Gugh is in the gullery there). T: frequent. B: scarce. MN: frequent. The bramble which I noted on M and T in 1975 and later recorded (in Margetts & David 1981) as *R. cornubiensis* (Rogers ex Riddlesd.) Rilstone turns out to have been this species. *R. cornubiensis* could nevertheless well occur, and Lousley may have been right to take up in his *Flora* the determination as that by Miles of a specimen collected by Miss K. Marks (in 1963?) at Holy Vale on M. This is now in **SLBI** but, while certainly having the appearance of that species, is too stunted to be fully convincing and to validate the sole record for Scilly.

R. dumnoniensis Bab. Strongly maritime and thus common on B, the inhabited island with the most oceanic climate. Occasional at best on M, A, T and MN.

R. iricus Rogers M: generally distributed and locally abundant (e.g. Garrison Hill and Halangy Down). T: rare, but in quantity among rhododendrons on Abbey Hill. B: local. MN: scarce, but abundant at the N.W. end from Tinkler's Hill to Pernangie. Believed endemic to the west of Ireland until its discovery on Alderney in 1993, this species can now be added to the flora of Britain (an old Cornish record having recently been exposed as an error for a shade form of *R. carnkiefensis* Rilstone). With its similarly strongly oceanic climate Scilly thus proves to be the suspected stepping-stone between those other two widely separated locations. That this was the "*R. macrophyllus* var. *umbrosus*?" listed by Townsend from "St. Mary's Marshes" is established by a sheet in **SLBI** bearing that determination in the respective handwritings of Babington and Bloxam; though there is no collector's name, the date and his characteristic pencilled scrawl on the label identify it unquestionably as Townsend's (the only one of his Scilly *Rubus* specimens apparently to have survived). There are also two excellent specimens of *R. iricus* from M and T (nos. *10,472* and *10,474*) in **E** collected by Miss M. McCallum Webster in 1966, labelled on the strength of determinations by Miles – with a query in one case – as *R. riddelsdellii* Rilstone. Miss McCallum Webster's Scilly *Rubus* records were unaccountably not passed on to Lousley, for although *R. riddelsdellii* features in the list in his subsequent *Flora* the two gatherings listed as determined as that species by Miles were made by Miss K. Marks and by Lousley himself. Lousley's specimen is in **BM** and too poor to be confidently determinable in my view, but Halangy Point, where it was collected, is a locality in which *R. iricus* is particularly conspicuous and plentiful. What Miss Marks collected, however, is certainly different – assuming the specimen presumptively of hers in **SLBI**, labelled simply "St. Mary's", came from near Rocky Hill in that island, the locality given in Lousley's *Flora*. The determination as *R. riddelsdellii* could in this case be correct; however, as I have nowhere met with that species in Scilly myself, and as one of the many hybrids of *R. ulmifolius* is also a possibility, it seems advisable to treat the record with reserve.

R. polyanthemus Lindeb. Proportionately much rarer than in the Channel Isles. M: among tall gorse near Garrison Hill crest and on a hedgebank on Buzza Hill, single bushes only in each case. T: three bushes under bracken, Gimble Porth.

R. prolongatus Boulay & Letendre M: locally abundant. A: hedges of Love Lane E. of St Warna's Well. T: Middle Down, in two places; one bush by Abbey entrance. MN: Tinkler's Hill, one patch.

R. rubritinctus W. C. R. Watson M: patch by the E. end of the Great Pool. MN: one or two bushes hidden among bracken on The Plains N. of Middle Town.

R. sprengelii Weihe Much more widespread and plentiful than on mainland Cornwall. M: hedgebank of Telegraph Road at SV/915.115, one bush; N. coast around Bar Point, in several places; small common W. of Porth Wreck; Porth Hellick, locally frequent. T: Middle Down, including a colony in scrub by Borough; Gimble Porth; E. end of the Great Pool; beside Abbey Pool. MN: Chapel Down; The Plains. An earlier record (Margetts & David 1981) based on a specimen in **E** collected by Miss M. McCallum Webster in 1966 has proved on re-examination to be incorrect; the material is too scrappy to be safely determinable but, being somewhat glandular, must in any case belong to some other taxon.

R. ulmifolius Schott Very common throughout.

R. leyanus Rogers A: a group of starved bushes in part of a bulbfield on Love Lane (SV/993.082) reverting to grass and scrub. An unlikely find on this, much the driest of all the five main islands and seemingly a recent arrival.

R. peninsulae Rilstone T: Abbey Gardens, one clump by the nursery area; margin of Salicetum on Pool Road, one patch. MN: abundant (but absent from most of Tinkler's Hill).

R. tuberculatus Bab. M: one bush in eroded pine plantation on Garrison Hill crest. Probably a recent bird-brought arrival. Earlier Scilly records for this species were errors (see below).

Five further species that occur appear to be undescribed – a proportion comparable with that of other areas with any considerable *Rubus* diversity. Three of these five are known elsewhere: a white-flowered member of sect. *Corylifolii* with numerous long patent prickles (erroneously referred to *R. myriacanthus* Focke previously and presumably also the "*R. diversifolius*" listed by Townsend from hedges in the interior of St Mary's), common on M, local on T, rare on B but absent from A and MN, is represented in **BM** by specimens from mainland Cornwall and Devon; a member of ser. *Sylvatici* with pink flowers and strongly hairy anthers, on heath margins in two places in the centre of MN, also occurs quite widely on Sark; and a member of ser. *Hystrix* with deep pink flowers and mostly obovate terminal leaflets, locally abundant in the N.W. of M and with a few scattered clumps or single bushes elsewhere on that island and on T also is known in profusion in woods in Brittany as well as in three or four isolated sites in the far south of England too. This last, which is the *R. hastiformis* W. C. R. Watson of Lousley's list (the two gatherings referred to are both in **BM**), is due to be described as a new species shortly.

Of the two species as yet unmatched with any *Rubus* known elsewhere, one is a second member of sect. *Corylifolii* with large pinkish flowers simulating those of *R. nemorosus* Hayne ex Willd. and, like that, characteristic of heath edges, on which it is thinly scattered on all the inhabited islands except A. The other, abundant among the plantations in the central parts of T, whence it has presumably been carried by birds to M (in profusion on Garrison Hill crest) and to one or two spots on B and MN, is a strikingly prickly member of ser. *Hystrix* with relatively small, pinkish or white flowers. This is clearly the "*R. koehleri*" of Townsend's list and the **BM** sheet reveals that it is also the "*R. pseudadenanthus*" listed by Lousley. A closer, but no less mistaken determination in 1975 was *R. rilstonei* W. C. Barton & Riddelsd. (published in Margetts & David 1981). This bramble seems likely to have been introduced to T at some period prior to 1862 with the imported exotics for which that island has long been renowned, but whether it came from elsewhere within the British Isles remains to be established.

DISCUSSION

As shown by Lousley, the vascular flora of Scilly exhibits numerous surprising anomalies, between the different islands on the one hand and between the group as a whole and mainland Cornwall, 45 km to the N.E., on the other. The pattern in *Rubus* turns out to be similar, but the anomalies can more confidently be ascribed for the most part to the varying efficiency of dispersal by birds than to differences of habitat or climate. So far as soil is concerned, the islands are all of granite (like much

of Cornwall) and equally favourable to the great majority of *Rubus* species that require moderately acid conditions.

Even so it is hard to understand why *R. prolongatus* should have had such success in colonising St Mary's but so slightly penetrated all four other inhabited islands, or why *R. peninsulae* should flourish in such profusion on St Martin's while apparently quite absent from its larger neighbour only 2·5 km to the south. It is no less perplexing that *R. rubritinctus*, a western bramble more than ordinarily dependent on birds for its dispersal and very common in the nearest parts of mainland Cornwall, should be so rare both in Scilly and in the Channel Isles (perhaps the frugivorous species in its particular case tend to be relatively sedentary ones?). *R. polyanthemus*, by contrast, is found on all the four largest Channel Isles and even in some quantity on Guernsey, yet has the appearance of a mere ephemeral straggler in Scilly. It too, though, is likewise one of the common species of western Cornwall, as also are *R. cornubiensis*, *R. riddelsdellii* and *R. rilstonei*, none of which are yet known for certain in Scilly – unlike *R. daveyi* and *R. prolongatus*, which are no less prominent on the adjacent mainland (Margetts 1990). Other species widespread in West Cornwall, v.c. 1, which might have been expected to occur in Scilly, are *R. newbouldianus* Rilstone, *R. stanneus* Rilstone and *R. ramosus* Bloxam ex Briggs.

Finally, there is the puzzle posed by the relative plenty in Scilly of *R. sprengelii*, a species which, though widely distributed across Europe, is scarcely found in Ireland outside the extreme S.E. corner and is present in Wales and S.W. England only very interruptedly and sparingly, so sparingly in Cornwall indeed that Rilstone (1952) had seen it in only one locality after 30 years of investigating *Rubus* in that county. Exceptionally distinct, it is not a species likely to be overlooked. Possibly it colonised the western periphery of Europe at a period when the climate was considerably more benign than today and has since retreated more or less wholly from those areas where more adverse conditions now prevail than those that continue to obtain in Scilly.

ACKNOWLEDGMENTS

Thanks are due to A. Newton and R. Gould for assistance with determinations.

REFERENCES

Allen, D. E. (1977). *Rubus sprengelii* Weihe in Scilly. *Watsonia* **11**: 425–426.
Lousley, J. E. (1971). *The flora of the Isles of Scilly*. David & Charles, Newton Abbot.
Margetts, L. J. (1990). The brambles of Cornwall. *Botanical Cornwall newsletter* **4**: 19–48.
Margetts, L. J. & David, R. W. (1981). *A review of the Cornish flora 1980*. Institute of Cornish Studies, Redruth.
Rilstone, F. (1952). *Rubi* from Dartmoor to the Land's End. *Watsonia* **2**: 151–162.
Townsend, F. (1864). Contributions to a Flora of the Scilly Isles. *Journal of botany* **2**: 102–120.

(*Accepted March 1996*)

Notes

THE CORRECT AUTHORITY FOR *RUBUS MELANODERMIS* (ROSACEAE)

An old manuscript note of A. J. Wilmott's recently came to light in **BM** in which he had pointed out that the name given by Focke (1890) to the bramble ever since known as *R. melanodermis* was a provisional one only. Reference to the original place of publication confirms that that is indeed the case: Focke's words leave no room for doubt on this score at all, and the name as published there is clearly invalid under Article 34.1(b) of the current *International Code* (Greuter *et al.* 1994). Unfortunately this has been overlooked by all authors subsequently. Luckily, however, the name was validated soon afterwards by Rogers and it can accordingly still stand, with the authority citation merely amended to: Focke ex Rogers, 1892, *Journal of botany* **30**: 302.

REFERENCES

Focke, W. O. (1890). Notes on English *Rubi*. *Journal of botany* **28**: 97–103, 129–135.
Greuter, W. *et al.* (1994). *International code of botanical nomenclature* (Tokyo Code), adopted at the Fifteenth International Botanical Congress, Yokohama, August–September 1993. *Regnum vegetabile* **131**.

D. E. Allen
Lesney Cottage, Middle Road, Winchester, Hants, SO22 5EJ

THE ROLE OF FORESTRY PLANTINGS IN THE DISPERSAL OF BRAMBLE (*RUBUS* L.) SPECIES

INTRODUCTION

An ongoing study of the *Rubus* L. (Rosaceae) flora of East Anglia, and especially Norfolk, (v.cc. 27 & 28) was started in 1968. During 1972 and for several years subsequently, visits were made to Colney Hall Wood, near Norwich (v.c. 27), chiefly because it was discovered that at least five of the species present were new to the county, their normal range being largely to the south of the Thames (Bull 1985). The five species concerned were *Rubus surrejanus*, *R. armipotens*, *R. cissburiensis*, *R. moylei*, and *R. marshallii* in descending order of frequency. Colney Hall Wood, at that time, was young conifer plantation probably planted in the early 1950s on the site of a former wood. However, the estate has been sold several times since the war, so the origin of the plantings are not now traceable.

In 1977, the author took Mr A. Newton, Prof. H. E. Weber from Germany and Mr J. van Winkel from Holland to the wood, and these confirmed all the findings in the field and proffered the opinion that the seeds must have arrived in the gut of migrating thrushes, e.g. Fieldfares and Redwings. This was accepted at the time on the assumption that a large flock probably fed up on a Surrey common before bad weather forced them to return northwards to Norfolk, a distance of c. 150 km. Also in 1977, *Rubus surrejanus* was found in Thetford Forest (v.c. 28) in a plantation near Emily's Wood, Weeting, and was later discovered to dominate one compartment. Interestingly, a single clump of a Scottish bramble, *R. septentrionalis*, was also found near Emily's Wood in 1977, *R. armipotens* was discovered nearby in 1983 and *R. moylei* in 1994. As *R. septentrionalis* has now gone from that site, it is assumed that it may have been introduced from Shouldham Forest (v.c. 28) about 25 km to the north west, where it is the dominant bramble almost throughout that beat. As a second Scottish bramble, *R. leptothyrsos*, is one of the most frequent species of plantations on the Royal Estate at Sandringham (v.c. 28), it was thought that these two species might possibly be native, as relicts of the Ice Age.

DISCUSSION

The theory of bird sown plantings from reverse migration has gone unchallenged since it was formulated. Bird sowings are undoubtedly the main source of arrival of isolated clumps or small colonies of bramble on coastal heathland, where the source of the seed is likely to be to the north west, north or north east of the colony. Tired Fieldfares and Redwings arriving at the top of Bard Hill, Salthouse, on the north Norfolk coast (v.c. 27), or near the cliff edge on Dunwich Common (v.c. 25) would have gone to roost on the ground amongst the heather, resulting in the appearance of small colonies of *R. incurvatus* in the first case and *R. errabundus* in the second.

Since work started on a new *Flora of Norfolk*, visits have been made to many woods and plantations within the county, with the result that one or two new county records have been made annually for the past several years. The southern *R. phaeocarpus* has been found in young woodland at Raynham and conifer plantations at Tittleshall (both v.c. 28). A strong colony of *R. rudis* was found in the centre of Shouldham Forest, and several others could be cited.

On 13 August 1996, a visit was paid to the Ken Hill Estate, Snettisham (v.c. 28). The area is not notably rich in bramble species, neither is bramble cover in the woods continuous. Species found over the majority of the estate in descending order of frequency were *R. ulmifolius*, an unnamed local representative of the group *Corylifolii* with abundant and excellent fruit, *R. polyanthemus*, *R. nemoralis*, *R. vestitus*, *R. lindleianus*, *R. pruinosus*, *R. boraeanus* and *R. amplificatus*. One plantation was filled with brambles, namely *R. surrejanus*, *R. phaeocarpus*, *R. moylei* (a second v.c. record), and with a small quantity of *R. adamsii*. All these species are of a southern distribution, and raise the question whether this could be the result of another large flock of birds.

The estate manager has only been at Ken Hill for eight years, but when approached to find out if he knew the history of the wood, he was able to consult a card index which provided the following information: "Cherry Breck Plantation. Very low grade arable land. Planted with conifers during the winter of 1945/46." Unfortunately the source of the nursery stock was not recorded.

The striking thing about Cherry Breck Plantation is the fact that the local bird population have not successfully seeded a single bush of the local dominants found in other woods within 100 m in the course of fifty years, so far as could be ascertained. Therefore the concept of a wood full of bramble seeds being transported from Surrey and prospering so abundantly would seem too incredible to be considered.

An approach was made to Mr E. V. Rogers, a retired forester living locally, and he was asked if he thought it possible that brambles could have been translocated with nursery stock in the years following the last war. His reply was in the affirmative, and the following passages are extracts from his letter.

"Plants in the nursery were undercut by spade or tractor and bundled up into hundreds by piecework. A seedling bramble would not have been removed and would have arrived in the bundle at the planting site. There, the bundle would have been 'heeled in' to keep the roots moist, at a number of points round the planting area. The bundles would have been cut open by the planter at the heeling in site, and weeds of any description would have been thrown to one side. Some of these would undoubtedly have taken root. [By inadvertantly being stamped in by the planter, as the planting area would have been bare soil following trenching to plant the young trees. A.L.B.] Any ungerminated seed that might have come with the young trees would be scattered in the soil with the roots of the trees. During the 1950s and 1960s there were many forest nurseries all over the country, significantly, particularly on the lighter soils in the south east, and with a few on heavier soils. These included nurseries at Bramshill near Camberley [Surrey], Brightling near Battle [Sussex], Rogate [Sussex], Fleet [Hants.] and Bedgebury, as well as at Kennington near Oxford and the New Forest. In the East Conservancy, local nurseries were at Didlington, Roudham and Lynford in Norfolk, and Bardney and Willingham in north Lincs. There were undoubtedly even more, long forgotten, especially in the south east. There was considerable movement of plants from nursery to nursery, and from nursery to forest. If something special was required such as Sitka Spruce, this might travel from Delamere [Cheshire], the Lake District, or even Scotland by train or lorry.

After the initial planting, gaps through death were replanted for from 1 to 5 years, so stock for this could have come from a different nursery to that from which the original planting came. [This could

have been the case in Shouldham Forest, where the abundance of *R. septentrionalis* suggests Scottish origin, with replacements coming from Bardney to introduce *R. rudis*. A.L.B.]

Regarding *R. leptothyrsos* throughout Sandringham plantations. Many foresters on private, including Royal, estates were Scots, who were more likely to obtain their nursery stock for greenfield sites from Scottish nurseries.

Private estates undoubtedly got the majority of their plantings from outside the county.

It should also be remembered that no herbicides were used at that time."

CONCLUSION

The discovery of bramble species in forestry plantations far from their normal areas of distribution would seem to be directly linked to the methods used both in the forest nurseries, and at the time of planting out the young trees, during the years immediately after the last war, and very probably for some while earlier. The current use of herbicides makes it much less likely that brambles will be introduced into new areas in this way in future.

ACKNOWLEDGMENT

The author would like to express his gratitude to Mr Rogers for his very full and comprehensive response to the request for information on tree planting practice just after the war.

REFERENCE

Bull, A. L. (1985). The *Rubus* flora of Norfolk and Suffolk. *Watsonia* **15:** 361–380.

A. L. Bull
Hillcrest, East Tuddenham, Dereham, Norfolk, NR20 3JJ

RUBUS MERCICUS J. E. BAGNALL REFOUND

In *Brambles of the British Isles*, Edees & Newton (1988) described *Rubus mercicus* J. E. Bagnall as a local endemic which had not been seen recently and might be extinct.

J. E. Bagnall described *R. mercicus* as a new species in 1892, from material collected at Water Orton, Warks., v.c. 38 (Bagnall 1892). Extensive gatherings seem to have been made there and at neighbouring Minworth over the next few years, judging from the amount of material in **BM** and **NMW** herbaria comprising Set 31 of *British Rubi*. The given habitat on many of the sheets was simply "hedgerows", a notoriously unstable habitat at the best of times, and it is perhaps no great surprise that no one seems to have found *R. mercicus* at either of the above sites since the early years of the present century. Neither does it seem to have been found elsewhere in Warwickshire. W. C. R. Watson records the species in ten vice counties other than Warwickshire, but in all cases it is now known that a very similar species was wrongly equated with *R. mercicus*. For example, A.L.B. searched for the plant during the 1970s at Rougham in W. Suffolk, v.c. 26, having seen a specimen in **CGE** collected by W. H. Mills c. 1947. The only unnamed plant found in the area was later included in *Rubus boudiccae* A. L. Bull & Edees (Bull & Edees 1980).

On 20 July 1965, E. S. Edees visited Bourne Wood in S. Lincs., v.c. 53, and collected a number of specimens which he did not name, and which are now in **NMW**. A.N. collected the same plant in 1975 as did A.L.B. in 1992, appending "*Rubus robiae*?" to the sheet (Yorkshire *mercicus* sensu Watson (1958)).

On 9 August 1995, the present authors met in Bourne Wood and, whilst examining bushes of this 'unknown' local, the conversation turned to *R. mercicus* and A.N. suggested that the plant might well be a candidate for the name. Perusing the description in Edees & Newton (1988), it was agreed that the plant tallied very closely on every given characteristic. However, when A.N. compared his gathering with some of Bagnall's sheets in his herbarium, the difference in the shape of the terminal leaflet gave some cause for concern, and the present panicles seemed much more robust.

On 25 September 1995, A.L.B. paid a return visit to Bourne Wood and made further stem piece gatherings which proved that the plant had a fairly wide range of terminal leaflet shape, and some of these matched Bagnall's gatherings well. Several sheets of Set 31 of *British Rubi*, and also of subsequent gatherings from Minworth, were borrowed by A.N. from **MANCH**, and by A.L.B. from **BM**. A.N. also borrowed one sheet of Set 31 of *British Rubi* and several of Edees' sheets from Bourne from **NMW**. When all were brought together and given a thorough examination, it was agreed that the Bourne plant is the same as Bagnall's original gatherings, notwithstanding the more robust panicles and, indeed, the general robustness of the Bourne plant as a whole. That this is due to environmental factors, there can be little doubt. The bushes at Bourne are along the sides of wide rides, and are growing on the S. Lincs. Jurassic limestone in company with a wide range of other *Rubus* species including *R. rudis* Weihe, *R. proiectus* van der Beek, *R. murrayi* Sudre, *R. raduloides* (Rogers) Sudre, *R. pedemontanus* Pinkwart, *R. leyanus* Rogers (all **herb. A.L.B.**), *R. vestitus* Weihe and *R. echinatus* Lindley.

A.L.B. has also found *R. mercicus* growing at Gunboro Wood, Edenham (**herb. A.L.B.**), just north of Bourne Wood, both woods being within grid reference TF/0.2, and by the roadside beside Newell Wood, just within the Lincs. county boundary in TF/0.1.

ACKNOWLEDGMENT

The authors wish to thank the Curators of the Herbaria at **BM**, **MANCH** and **NMW** for their loans of specimens.

REFERENCES

Bagnall, J. E. (1892). A new Bramble. *Journal of botany* **30**: 372–373.
Bull, A. L. & Edees, E. S. (1980). A new Bramble from East Anglia. *Watsonia* **13**: 121–122.
Edees, E. S. & Newton, A. (1988). *Brambles of the British Isles*. Ray Society, London.
Watson, W. C. R. (1958). *Brambles of Great Britain and Ireland*. Oxford University Press, Oxford.

A. L. Bull
Hillcrest, East Tuddenham, Dereham, Norfolk, NR20 3JJ
A. Newton
10 The Fairways, Leamington Spa, Warwickshire, CV32 6PR

THE 'J.D.' HERBARIUM AT NORTHAMPTON MUSEUM

There is a herbarium at Northampton Museum (**NTN**) which for many years has remained semi-anonymous. It was referred to by Druce (1930) as "Professor Henslow's" and more recently attributed by Kent & Allen (1984) to John Dorrington (fl. 1814–61, a member of the Botanical Society of London, who lived in Cambridgeshire). John Dorrington M.A. was born in Henham, Essex, in 1815. He was Principal of the Collegiate School at Linton, Cambridgeshire in 1851 (Census), and he died at Rickmansworth, Herts. ((Desmond (1994) and International Genealogical Index).

The herbarium consists of about 800 sheets contained in ten volumes. About 220 are from

Cambridgeshire (v.c. 29), and most of these bear the initials "J.D." but there are also 21 from J. S. Henslow, four from C. E. Broome, and two each from G. B. Jermyn and L. Jenyns. Another 400 or so are from Henslow from all over England, Wales and Scotland, and amongst others, there are 35 from C. C. Babington (collected from 1828–1832), and three from W. Wilson, including *Arbutus unedo* L. from Killarney.

The Cambridgeshire specimens were all collected by J. D. between 1829 and 1832, and it seemed that the bearer of those initials was most probably a student of Henslow's at Cambridge, and one with a strong connection with Northamptonshire.

A search of Henslow's botany class lists (University Archives O.XIV.261, Cambridge University Library) revealed that they included a John Downes in 1830, 1831 and 1832. Downes was admitted to Christ's College on 5 May 1829 (a little over a year after Charles Darwin) and graduated B.A. in 1833 (Peile 1913). From 1834 to 1863 he was Perpetual Curate at Horton with Piddington (where he gave an elaborate new font to the church) and from 1866 to 1890, Rector of Hannington, where he died aged 80 in 1890 and where the east window is dedicated to his memory. Since these parishes are both near Northampton and since after leaving Cambridge, Downes collected only a few specimens, all near Horton in 1837–40, these facts suggest that he lost interest in botany. It is very likely therefore that Downes was prevailed upon to add his herbarium to the founder collections of the new Museum at Northampton.

Downes was born in 1810 in Lambeth (Census 1881), the son of Arthur Downes of Sloane Street. He married in 1833 aged 23. His wife Lucy, died only seven months before Downes, in 1890, and there are references to their many children in Lucy's marriage settlement papers (ZB 531/1–135, Northamptonshire Record Office). Downes also seemed to be of independent means. His address at the time of entering Christ's College is listed as Whiteknights, Reading or 124 Sloane Street, and there are a few specimens collected at "White Knights" in the summers of 1830 and 1831 in his herbarium.

That Downes enjoyed the friendship of Henslow is well shown by the latter's numerous gifts to him, designed to provide him with at least one example of most British species; in addition there are 32 sheets from Cambridgeshire collected by "J. Downes" between 1829–1833 in Henslow's herbarium in **CGE**. The handwriting of Henslow and Downes is very similar, and Druce could easily have thought they were all in the same hand. He is known also to have been a friend of the Rev. George Bitten Jermyn, Curate of Swaffham Prior, and may have been too of the Rev. Leonard Jenyns, Vicar of Swaffham Bulbeck, since many of his specimens in **NTN** and **CGE** are from Bottisham, Swaffham Prior and Reche. His signature can be seen in the list of visitors to the Swaffham Prior Natural History Society (ADD.6460, Cambridge University Library). Indeed, it is possible that he was tutor to the Rev. Jermyn's children (who ran the Natural History Society) since Downes started collecting in that vicinity already in April 1829, the month before he came up to Christ's College and he continued collecting there most of that summer, on a total of 65 days between 7 April and 5 October. The following year he was only based there from 26 May until 20 June, and again on 1 and 2 July. All his other Cambridgeshire collections were made around Cambridge, or at Henslow's excursions' sites.

Downes' friendship with Darwin is illustrated by a number of letters in Darwin's correspondence (Burkhardt & Smith 1985). One of these shows that like so many botanists of that time, Downes was perhaps also an entomologist. Darwin, after leaving Cambridge in June, writes to Henslow from Shrewsbury on 11 July 1831, "Would you tell Jenyns, that his magnificent present of Diptera has not been wasted on me. Would you ask him how he manages Diptera when too small for a pin to go through? . . . Do you by any chance recollect the name of a fly that Mr Bird sent through Downes." Of course, he may just have been a messenger! On 25 October 1831 Henslow wrote to Darwin who was waiting at Devonport to start his voyage on the *Beagle*, "Downes is just returned from a short tour in Switzerland, but what is that to a Fuegian." Lastly, Henslow wrote to Darwin, then on board the *Beagle*, on 21 January 1833 "The Examn is over & no Xts man plucked- [no man from Christ's College failed] I don't know whether you were acquainted with the men of this yr (except Downs who is No. 26) . . . Downes & other friends have begged me to remember them to you most kindly & affectionately . . ."

The evidence for John Downes, though circumstantial, is extremely strong whereas no evidence has emerged to support the view that the herbarium is that of Dorrington, or that in either case the herbarium had belonged to Henslow.

ACKNOWLEDGMENTS

I am greatly indebted to Mr Brian Webster of the Northampton Museum for all his kind help with examining the herbarium, and for information regarding Downes' involvement with his churches at Horton and Hannington.

I am grateful to Dr D. E. Coombe for drawing my attention to Peile (1913) and the Darwin Letters, and to Dr D. E. Allen for reminding me that there were supposedly 1700 specimens from Cambridgeshire in the herbarium at Northampton. In addition I am indebted to Dr Allen and to Mr C. D. Preston for their help and invaluable comments.

REFERENCES

Burkhardt, F. & Smith, S. eds. (1985). *The correspondence of Charles Darwin,* **1**, 1821–1836. Cambridge University Press, Cambridge.

Census *Enumerators' Schedules for Cambridgeshire*. 1851. Microfilm. Cambridgeshire Record Office.

Census *Enumerators' Schedules for Northamptonshire*. 1881. Microfilm. Northamptonshire Record Office.

Desmond, R. (1994). Dictionary of British and Irish botanists and horticulturists. Taylor & Francis and the Natural History Museum, London.

Druce, G. C. (1930). *Flora of Northamptonshire*. T. Buncle & Co., Arbroath.

International Genealogical Index. General Society of Utah. Microfilm. Cambridgeshire Record Office.

Kent, D. H. & Allen, D. E. (1984) *British and Irish herbaria*, pp. 60, 130. Botanical Society of the British Isles. London.

Peile, J. (1913). *Biographical register of Christ's College*, **2**, 1666–1905, p. 434. Cambridge University Press, Cambridge.

G. Crompton
103 Commercial End, Swaffham Bulbeck, Cambridge, CB5 0ND

THE CORRECT AUTHORITY FOR LESSER CHICKWEED, *STELLARIA PALLIDA* (CARYOPHYLLACEAE)

Mill (1996) correctly points out that the combination *Stellaria pallida* (Dumort.) Piré (1863) as adopted by Stace (1991), Kent (1992) and other modern authors is invalidly published. He further comments that the earliest valid publication of the epithet *pallida* under *Stellaria* that he has been able to trace is by Murbeck (1891). Murbeck's publication of the name *S. pallida* is predated by twenty-five years by Crépin (1866); a reference to the change of author from Piré to Crépin was given in Kent (1993). The citation of the species is accordingly:

Stellaria pallida (Dumort.) Crépin, *Man. Fl. Belgique*, ed. 2, 19 (1866).
Alsine pallida Dumort., *Fl. Belg.* 109 (1827).
Stellaria pallida (Dumort.) Piré, *Bull. Soc. Roy. Bot. Belgique* **2**: 49 (1863), nom. inval.

REFERENCES

Crépin, F. (1866). *Manuel de la flore de Belgique*, ed. 2: 19.

Kent, D. H. (1992). *List of vascular plants of the British Isles*. Botanical Society of the British Isles, London.

Kent, D. H. (1993). *List of the vascular plants of the British Isles. Errata* [2]. Botanical Society of the British Isles, London.

Mill, R. R. (1996). The correct authority for lesser chickweed, *Stellaria pallida* (Caryophyllaceae). *Watsonia* **21**: 204–205.

Murbeck, S. (Apr-May 1891). *Beiträge zur Kenntnis der Flora von Südbosnien und der Hercegowina.* Being *Lunds Universitets Årsskrift* **27**(5): 1–182.

Piré, L. (1863). Notice sur l'*Alsine pallida* Dmtr. *Bulletin de la Société Royale de Botanique de Belgique* **2**: 43–49.

Stace, C. A. (1991). *New Flora of the British Isles*. Cambridge University Press, Cambridge.

D. H. Kent
75 Adelaide Road, West Ealing, London, W13 9ED

CONTRIBUTIONS TO A CYTOLOGICAL CATALOGUE OF THE BRITISH AND IRISH FLORA, 5

As part of our continuing cytological survey of vascular plants native to the British Isles (Dempsey *et al.* 1994), we present here chromosome counts from a total of 116 populations of 107 species. One plant from each population was studied, except where noted. Material sent to us from the seed bank at the Royal Botanic Gardens, Wakehurst Place, is referenced by its seed bank serial number. All counts were made on squashes of root-tips, except in the case of *Dactylorhiza fuchsii* where pollen mitosis was observed, *Gymnadenia conopsea* subsp. *conopsea* in which ovary wall tissue was used and *Listera ovata* where pollen mother cells were studied. Supernumerary chromosomes are designated by the suffix 'S'. Voucher specimens for the counts are at **LTR**, except for some that are at **K** or have not been made, as indicated.

Acer campestre L., 2n = 26: Leics., v.c. 55, Clipsham quarry, SK/98.15.
Aethusa cynapium L., subsp. *cynapium*, 2n = 20: E. Suffolk, v.c. 25, Great Wenham, old rectory opposite church, TM/07.38.
Alisma plantago-aquatica L., 2n = 14: S. Northumb., v.c. 67, Hadston Links, NU/2.0 (no voucher).
Alliaria petiolata, 2n = 42: Caerns., v.c. 49, Nanhoron Valley, S. of Inkermann Bridge, SH/287.323.
Allium schoenoprasum L., 2n = 16: Pembs., v.c. 45, St David's Head, SM/7.2 (no voucher, Kew seed bank serial no. 0024549).
Alopecurus myosuroides Hudson, 2n = 14: Oxon, v.c. 23, Little Bourton, farm near M40 motorway, SP/4.4.
Anisantha sterilis (L.) Nevski, 2n = 14: Oxon, v.c. 23, Little Bourton, farm by M40 motorway, SP/4.4.
Anthriscus caucalis M. Bieb., 2n = 14: N. Lincs., v.c. 54, Woodhall Spa, end of Sandy Lane, Sandy Acres gateway, TF/219.645.
Aphanes arvensis L., 2n = 48: E. Suffolk, v.c. 25, Great Wenham, TM/077.383 (no voucher).
Aphanes inexspectata Lippert, 2n = 16: Leics., v.c. 55, Clipsham, edge of Holywell Wood, SK/98.15.
Athyrium filix-femina (L.) Roth, 2n = 80: W. Lancs., v.c. 60, Lord Lots Wood, near Kellet, SD/545.708 (no voucher).
Ballota nigra L. subsp. *foetida* (Vis.) Hayek, 2n = 22: E. Suffolk, v.c. 25, Great Wenham, N. of church, TM/07.38.
Bromus hordeaceus L. subsp. *hordeaceus*, 2n = 28: W. Sussex, v.c. 13, Wiggonholt Common, TQ/05.16 (three plants counted, **K**, Kew seed bank serial no. 0012603).
Callitriche stagnalis Scop., 2n = 10: Caerns., v.c. 49, near Llangwnnadl, SH/21.34 (no voucher).
Capsella bursa-pastoris (L.) Medikus, 2n = 32: E. Suffolk, v.c. 25, Great Wenham, old rectory opposite church, TM/07.38.
Centaurea nigra L., 2n = 44: N. Hants., v.c. 12, near Petersfield, W. of Shoulder of Mutton, above Steep, SU/7.2.
Chaenorhinum minus (L.) Lange, 2n = 14: W. Lancs., v.c. 60, Heysham Moss sidings, old railway yard, SD/422.605.
Conium maculatum L., 2n = 22: Oxon, v.c. 23, Little Bourton, farm near M40 motorway, SP/4.4 (two plants counted).
Cornus sanguinea L., 2n = 22: Leics., v.c. 55, Clipsham quarry, SK/98.15.
Crambe maritima L., 2n = 60: S. Hants., v.c. 11, Lee-on-the-Solent, SU/56.00; W. Lancs., v.c. 60, near Abbey Lighthouse cottage, SD/431.543 (no voucher).
Cuscuta epithymum (L.) L., 2n = 14: S. Somerset, v.c. 5, Exmoor, Selworthy, SS/9.4 (three plants counted, no voucher).
Cyperus fuscus L., 2n = 36: S. Hants., v.c. 11, Breamore, SU/1.1 (two plants counted, Kew seed bank serial no. 0034975).
Dactylorhiza fuchsii (Druce) Soó, n = 20: N.E. Yorks., v.c. 62, Bolton's Bog, SE/8.8.
Deschampsia flexuosa (L.) Trin., 2n = 28: W. Sussex, v.c. 13, Balcombe, Upperstaff Wood, TQ/3.3 (Kew seed bank serial no. 0026406).
Eleogiton fluitans (L.) Link, 2n = 60: Caerns., v.c. 49, N. of Castell Cilan, easternmost pool, SH/29.24.
Erigeron acer L., 2n = 18: Leics., v.c. 55, Clipsham quarry, SK/98.15.

Euphorbia exigua L., 2n = 24: Dorset, v.c. 9, Milbourne St Andrew, SY/81.97.
Euphorbia helioscopia L., 2n = 42: Leics., v.c. 55, Clipsham quarry, SK/98.15.
Euphorbia platyphyllos L., 2n = 30: Dorset, v.c. 9, Sherbourne, ST/63.16 (three plants counted).
Festuca gigantea (L.) Villars, 2n = 42: Berks., v.c. 22, near Hurley, SU/8.8 (two plants counted, no voucher, Kew seed bank serial no. 0035846).
Galium mollugo L. subsp. *erectum* Syme, 2n = 44: W. Lancs., v.c. 60, above Saltmire bridge, SD/519.754.
Galium verum L., 2n = 44: Caerns., v.c. 49, Pwllheli, SH/37.34 (no voucher).
Geranium sylvaticum L., 2n = 28: W. Lancs., v.c. 60, near Nether Burrow, track off Woodmans Lane near Lindel Barn, SD/620.751.
Gnaphalium uliginosum L., 2n = 14: Leics., v.c. 55, Clipsham quarry, edge of Holywell Wood, SK/98.15; W. Lancs., v.c. 60, near Lancaster, SD/465.625 (no voucher).
Gymnadenia conopsea (L.) R.Br. subsp. *borealis* (Druce) F. Rose, 2n = 40: Derbys., v.c. 57, Hartington, SK/1.6.
Gymnadenia conopsea (L.) R.Br. subsp. *conopsea*, 2n = 40: Derbys., v.c. 57, Hartington, SK/1.6.
Hordeum murinum L., 2n = 28: v.c. 21, London, Highgate, N. of E. end of West Hill, TQ/2.8 (**K**, Kew seed bank serial no. 0057794).
Hyoscyamus niger L., 2n = 34: Dorset, v.c. 9, Ringstead, SY/75.81 (two plants counted).
Inula crithmoides L., 2n = 18: Dorset, v.c. 9, Portland Bill, SY/6.6.
Isoetes histrix Bory, 2n = 20: Channel Is., v.c. S, Alderney, Quesnard, WA/606.089 (no voucher).
Juncus bulbosus L., 2n = 40: Caerns., v.c. 49, N. of Castell Cilan, SH/29.24.
Juncus gerardii Lois., 2n = 84, Glam., v.c. 41, Whiteford, SS/445.943.
Juncus maritimus Lam., 2n = 48: W. Lancs., v.c. 60, Potts Corner, SD/41.57.
Kickxia spuria (L.) Dumort., 2n = 18: Dorset, v.c. 9, Bovington, SY/8.8.
Legousia hybrida (L.) Delarbre, 2n = 20: Dorset, v.c. 9, Cheselbourne, SY/76.99.
Lepidium campestre (L.) R.Br., 2n = 16: E. Sussex, v.c. 14, South Downs, near Lewes, below Blackcap Beacon, TQ/37.12 (Kew seed bank serial no. 0018580).
Lepidium latifolium L., 2n = 24: E. Suffolk, v.c. 25, Felixstowe, Landguard Nature Reserve, 0·8 km from docks, TM/2.3 (**K**, Kew seed bank serial no. 0039316).
Leymus arenarius (L.) Hochst., 2n = 56: W. Lancs., v.c. 60, Bank Houses, SD/432.531 (no voucher).
Linaria vulgaris Miller, 2n = 12: Leics., v.c. 55, Shackerstone railway station embankment, SK/3.0.
Listera ovata (L.) R.Br., n = 18 + 1S: N.E. Yorks., v.c. 62, Bolton's Bog, SE/8.8.
Lonicera periclymenum L., 2n = 54: Westmorland, v.c. 69, Meathop Moss, c. 3 km N.E. of Lindale, SD/44.81 (no voucher).
Lotus corniculatus L., 2n = 24: Dorset, v.c. 9, c. 1·5 km W. of Burton Bradstock, SY/47.89.
Lychnis flos-cuculi L., 2n = 24: Dorset, v.c. 9, Bere Regis, SY/8.9 (no voucher); Warks., v.c. 38, Sutton Coldfield, Sutton Park, SP/10.97.
Lychnis viscaria L., 2n = 24: Rads., v.c. 43, Stanner Rock, 4 km N.W. of Kington (via garden of Mrs Port), SO/26.58.
Lythrum salicaria L., 2n = 60 + 1–2S: Cambs., v.c. 29, Wicken Fen, TL/5.7 (Kew seed bank serial no. 0024734).
Malva neglecta Wallr., 2n = 42; E. Suffolk, v.c. 25, Great Wenham, old rectory opposite church, TM/07.38 (two plants counted).
Melica uniflora Retz., 2n = 18: W. Lancs., v.c. 60, Silverdale, Gait Barrows N.N.R., SD/485.774 (no voucher).
Molinia caerulea (L.) Moench, 2n = 36: Dorset, v.c. 9, Cranbourne Common, c. 10 km S.E. of Cranbourne, SU/10.11; W. Suffolk, v.c. 26, near Holywell Row, TL/723.767.
Myosotis secunda A. Murray, 2n = 48: Caerns., v.c. 49, N. of Castell Cilan, SH/29.24 (no voucher).
Myrrhis odorata (L.) Scop., 2n = 22: W. Lancs., v.c. 60, estuary, near Lythe Bridge (grid reference not supplied, no voucher).
Ononis reclinata L., 2n = 60: Pembs., v.c. 45, Stackpole, Barafundle Bay, SR/9.9 (Kew seed bank serial no. 0021607).
Orchis morio L., 2n = 36: Caerns., v.c. 49, Abersoch golf course, SH/3.2 (no voucher).
Persicaria bistorta (L.) Samp., 2n = 48: W. Lancs., v.c. 60, Lancaster University grounds, SD/48.57 (no voucher).

Phleum pratense L., 2n = 42: W. Sussex, v.c. 13, Ardingly reservoir basin, TQ/3.2 (two plants counted, **K**, Kew seed bank serial no. 0051988); W. Lancs., v.c. 60, near Lancaster, SD/468.624.
Poa compressa L., 2n = 42: W. Lancs., v.c. 60, (no further details).
Prunus avium (L.) L., 2n = 16: Surrey, v.c. 17, Coulsdon, Old Lodge Lane, TQ/31.59.
Ranunculus auricomus L., 2n = 32: E. Suffolk, v.c. 25, Great Wenham, churchyard, TM/07.38.
Rumex hydrolapathum Hudson, 2n = 130: W. Lancs., v.c. 60, Leighton Moss R.S.P.B. reserve near Silverdale, SD/484.749.
Rumex longifolius DC., 2n = 60: Mid-W. Yorks., v.c. 64, Ingleton, SD/69.73 (no voucher).
Rumex maritimus L., 2n = 40: W. Norfolk, v.c. 28, East Wretham Heath, Ringmere, TL/90.87 (three plants counted, Kew seed bank serial no. 0003735).
Rumex palustris Smith, 2n = 60: Carms., v.c. 44, Cil-y-cwm, SN/753.397 (two plants counted, **K**, Kew seed bank serial no. 0033484).
Rumex sanguineus L. var *viridis* (Sibth.) Koch, 2n = 20: Oxon, v.c. 23, Little Bourton, farm near M40 motorway, SP/4.4 (two plants counted); W. Lancs., v.c. 60, Lancaster University grounds, SD/48.57.
Sagina procumbens L., 2n = 22: Middlesex, v.c. 21, London, W. Hampstead, behind Berridge House at S. side of theatre, TQ/2.8 (Kew seed bank serial no. 0062974); Caerns., v.c. 49, Llys Hyfryd, SH/28.33.
Sagina subulata (Sw.) C. Presl, 2n = 22: Caerns., v.c. 49, Mynyddy Gwyddel, Uwchmynydd, SH/14.25.
Salix purpurea L., 2n = 38: W. Lancs., v.c. 60, Silverdale, Gait Barrows N.N.R., Hawes Water, SD/478.764.
Sanguisorba minor Scop, subsp. *minor*, 2n = 28: Dorset, v.c. 9, Melbury hill, ST/87.19.
Schoenoplectus tabernaemontani (C. Gmelin) Palla, 2n = 42: Glam., v.c. 41, Whiteford, SS/445.943 (no voucher).
Scleranthus perennis L. subsp. *prostratus* Sell, 2n = 22: W. Suffolk, v.c. 26, Eriswell, Lordswell Field, TL/7.7 (**K**, Kew seed bank serial no. 0033912).
Sedum anglicum Hudson, 2n = 160: Caerns., v.c. 49, Pen Bodlas, Llaniestyn, SH/28.33 (no voucher).
Silene noctiflora L., 2n = 24: Cambs., v.c. 29, Fen Ditton, TL/513.597 (Kew seed bank serial no. 0012991).
Silene otites (L.) Wibel, 2n = 24 + 0 or 2S: W. Suffolk, v.c. 26, Eriswell, Lordswell Field, TL/7.7 (five plants counted, only one with supernumeraries, Kew seed bank serial no. 0035019).
Stellaria graminea L., 2n = 26: Dorset, v.c. 9, Winterbourne Kingston, SY/86.97; Middlesex, v.c. 21, Enfield, Hadley Wood, 100 m S. of covertway, E. of S.E. path, TQ/3.9 (**K**, Kew seed bank serial no. 0064462).
Stellaria holostea L., 2n = 26: Caerns., v.c. 49, near Llaniestyn, SH/26.33 (no voucher).
Stellaria neglecta Weihe, 2n = 22: Caerns., v.c. 49, near Bodegroes, SH/35.35.
Symphytum tuberosum L., 2n = 96: W. Lancs., v.c. 60, near Yealand Conyers, SD/509.746.
Tamus communis L., 2n = 48: Leics., v.c. 55, Clipsham quarry, SK/98.15.
Thlaspi arvense L., 2n = 14: E. Suffolk, v.c. 25, Great Wenham, TM/077.383.
Thymus polytrichus A. Kerner ex Borbás subsp. *britannicus* (Ronn.) Kerguélen, 2n = 56: Caerns., v.c. 49, Pwllheli, SH/37.34.
Torilis arvensis (Hudson) Link, 2n = 12: Warks., v.c. 38, Ingon Grange Farm, SP/214.590 (two plants counted).
Torilis japonica (Houtt.) DC., 2n = 16: Westmorland, v.c. 69, Sandscale Haws, SD/19.75 (two plants counted, no voucher).
Trifolium pratense L., 2n = 14 + 0 or 2S: S. Wilts., v.c. 8, Parsonage Down, N.C.C. Nature Reserve, SU/0.4 (three plants with supernumeraries and three without, Kew seed bank serial no. 0058481); 2n = 14: Caerns., v.c. 49, Pen Bodlas, Llaniestyn, SH/28.33.
Trifolium suffocatum L., 2n = 16: W. Sussex, v.c. 13, Pagham, E. of car park, SZ/8.9 (Kew seed bank serial no. 0007548).
Triglochin maritimum L., 2n = 48: W. Lancs., v.c. 60, near Carnforth, SD/482.702.
Ulex gallii Planchon, 2n = 96: Channel Is., v.c. S, Alderney, Essex Hill, WA/592.074.
Ulmus glabra Hudson, 2n = 28: Derbys., v.c. 57, Dovedale, SK/1.5 (no voucher).
Urtica dioica L., 2n = 48: W. Lancs., v.c. 60, Lancaster University, SD/48.57.

Verbascum pulverulentum Villars, 2n = 32: Cambs., v.c. 29, near Cottenham, TL/442.674 (**K**, Kew seed bank serial no. 0034997).
Verbena officinalis L., 2n = 14: N. Somerset, v.c. 6, Burrington Coombe, ST/4.5.
Veronica agrestis L., 2n = 28: Dorset, v.c. 9, Upton Park, SY/99.92.
Veronica arvensis L., 2n = 16: Caerns., v.c. 49, Bardsey Is., near abbey ruin, SH/12.22.
Veronica chamaedrys L., 2n = 32: Derbys., v.c. 57, Dovedale, SK/14.52.
Veronica scutellata L., 2n = 18: Caerns., v.c. 49, N. of Castell Cilan, easternmost pool, SH/29.24 (no voucher).
Veronica verna L., 2n = 16: W. Suffolk, v.c. 26, Icklingham, Triangle Pit, TL/7.7 (no voucher, Kew seed bank serial no. 0007102).
Viburnum opulus L., 2n = 18: Leics., v.c. 55, Clipsham quarry, SK/98.15.
Vica bithynica (L.) L., 2n = 14: Dorset, v.c. 9, Weymouth, landward shore of Fleet Lagoon, SY/66.76.
Viola palustris L. subsp. *palustris*, 2n = 48: W. Lancs., v.c. 60, Lord Lots Wood, SD/546.708.
Viola reichenbachiana Jordan ex Boreau, 2n = 20: Surrey, v.c. 17, Purley, TQ/31.59.
Zannichellia palustris L., 2n = 36: W. Lancs., v.c. 60, Leighton Moss outlet, near Silverdale, SD/476.738 (no voucher).

ACKNOWLEDGMENTS

We are most grateful to J. Terry of the seed bank at the Royal Botanic Gardens, Kew (Wakehurst Place), B. Bonnard, H. Bowen, I. Brown, A. P. Conolly, F. Horsman, L. & P. Livermore, J. Partridge and T. C. G. Rich for help in acquiring plant material.

REFERENCE

Dempsey, R. E., Gornall, R. J. & Bailey, J. P. (1994). Contributions to a cytological catalogue of the British and Irish flora, 4. *Watsonia* **20**: 63–66.

L. Montgomery, M. Khalaf, J. P. Bailey & R. J. Gornall
Botany Department, University of Leicester, Leicester, LE1 7RH

CAREX HUMILIS LEYSSER IN DORSET (v.c. 9)

Carex humilis (Cyperaceae) is a widespread sedge throughout Europe and Asia with Britain nearly at its northerly limit. The ecology of the species is described in *Scarce plants in Britain* (Stewart *et al.* 1994) and this note reviews the conservation status and future of the remaining 56 sites for the species in Dorset. Although there are outliers on the limestone in Somerset (v.c. 6), Gloucestershire (v.c. 34) and Monmouth (v.c. 35), the vast majority of the British sites are on the chalk in Wiltshire (v.cc. 7 & 8) and Dorset, with a very few in Hampshire (v.c. 11) – in fact 89 out of 124 tetrads recorded since 1970 are wholly or partly in Wiltshire (Stewart *et al.* 1994).

In Dorset the species currently occurs in 56 sites, (50 1-km squares (Fig. 1) and 33 tetrads (some of which it shares with Wiltshire)). Over the last five years, the writer, and colleagues, inspired especially by Dick David, have visited the site of every known colony in the county, including all the old sites where historical records exist.

The results of these visits are summarised in Tables 1 and 2.

It will be seen that only seven sites are covered by designation as Sites of Special Scientific Interest and that these seven sites form part of four S.S.S.I.s. The population at one of these, Handcocks Bottom, Site 18, is now very small after ploughing in the 1980s. Another of the sites, Site 20 at Blandford Camp, was partly destroyed before designation, and is now in the path of further proposed building, and is ungrazed and divided by a fence. This is the only *level* downland site remaining that I know, preserved in the 19th century by being part of the Blandford Racecourse, and since by being a military camp.

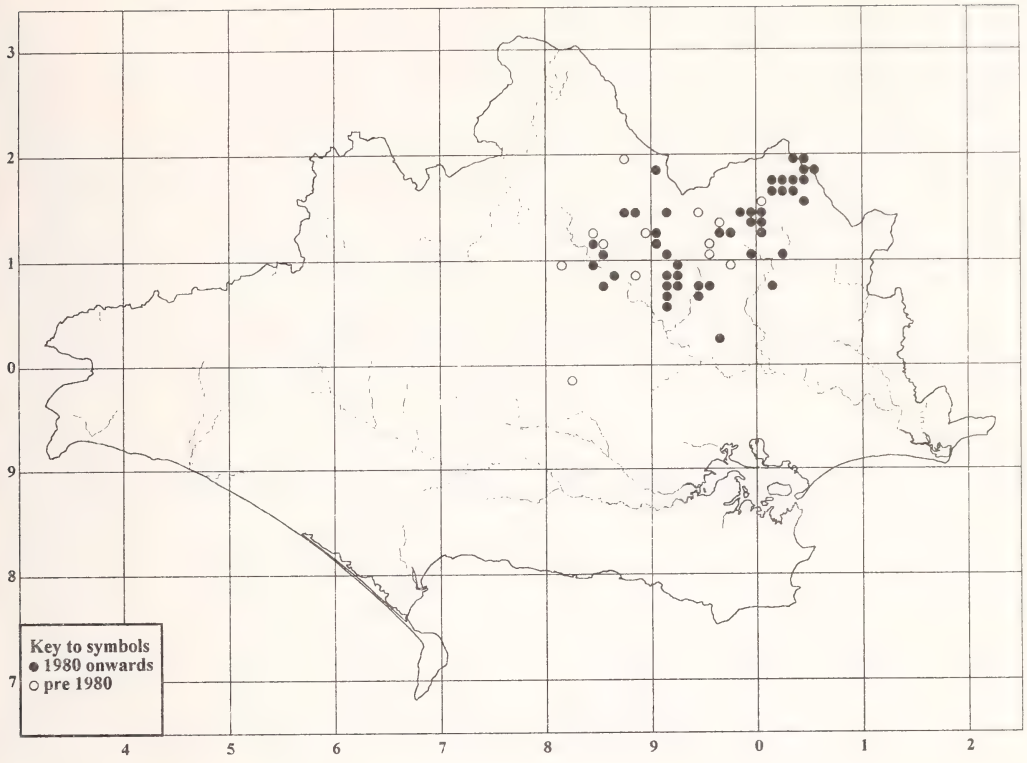


FIGURE 1. The distribution of *Carex humilis* in Dorset (v.c. 9)

All but four of the remaining sites are designated as Sites of Nature Conservation Interest (S.N.C.I.s). This is a completely non-statutory appellation, arising from a scheme run by the Dorset Wildlife Trust and Dorset Environmental Records Centre, to discover and notify sites that have habitats or species important in a Dorset context. These sites, being unimproved chalk downland and having *C. humilis* meet the criteria. Sites 3, 9, 12, 26, 32, 33, 34, 35, 36, 38, 39, 41, 42, 43 and 47 are not grazed, or to my knowledge, managed in any way. Only exposure and, possibly, rabbit grazing might stop coarser vegetation completing the destruction of what are already precarious colonies. Most are on ancient monuments, fenced and unploughed in a sea of arable. There seems no way of sensibly managing them.

Site 11 forms part of a golf course, and the current mowing regime suits the species. Site 36 was almost lost; a keen conservationist cleared the scrub and saved most of the site. Now (1996) it is ungrazed and returning to scrub. Sites 49–56 are all part of the earthwork forming the Dorset-Wiltshire boundary. The wardens of the Martin Down N.N.R. on the Wiltshire site have cleared scrub from the dyke, but since it is relatively ungrazed and quite rank, only the shorter patches at the south-east end around Blagdon Gap have a secure future.

That leaves somewhere between 25 and 30 sites where one can say with some confidence that given current management the future of the plant is secure, and thus roughly the same number where strong doubts must exist, including perhaps six where it will disappear under invading scrub within the next few years. On the other hand, at one site, Site 20, although the surrounding grass and scrub is now 40 cm high, the plants are still surviving, and would presumably respond to management.

There must be a caveat concerning the quality of the historical information, and thus the losses before, say, the last war. Both the Dorset county Floras list few sites with no indication of whether these constitute an exhaustive list. But, as only a few steep slopes or earthworks are likely to have

TABLE 1. DETAILS OF *CAREX HUMILIS* EXTANT SITES IN DORSET (V.C. 9)

	Grid reference	Site name	Conservation status	Recorders	Date of last visit	Number of plants	Management	Threat
1	ST/842.090	Enford Bottom	SNCI	RWD, DP, RF	1992	1,000+	G	
2	ST/852.077	Websley Farm	SNCI	RWD, DP, RF	1991	100+	G	
3	ST/862.088	Durweston Bridge	SNCI	HJMB, DP	1992	20+	–	T
4	ST/847.121	Hambledon Hill	SSSI:NT	HJMB	1993	1,000+	G	
5	ST/847.115	Hambledon Hill	SSSI	HJMB	1993	100+	G	
6	ST/851.114	Hambledon Hill	SSSI	HJMB	1993	100+	G	
7	ST/855.105	Hod Hill	SSSI:NT	DP	1994	10,000+	G	
8	ST/880.143	Brookmans Valley	SNCI	RW	1989	<10	G	T
				BE, DP	1995	<10	G	
9	ST/879.144	Brookmans Valley	SNCI	BE, DP	1995	100+	G	
10	ST/919.059	Buzbury Rings – W of B3082	SNCI	RWD, RF, DP	1992	<30	–	T
11	ST/919.060	Buzbury Rings – E of B3082	SNCI	RWD, RF, DP	1992	<50	M	(T)
12	ST/915.067	Keynston Down Long Barrow	–	RWD, RF, DP	1992	<50	–	T
13	ST/947.071	Tarrant Rawston – The Cliff	SNCI	DP	1992	1,000+	G	
14	ST/952.076	Tarrant Rawston – The Cliff	SNCI	DP	1992	1,000+	G	
15	ST/942.065	Tarrant Rawston – The Cliff	SNCI	BE	1993	100+	G	
16	ST/964.028	Badbury Rings	SNCI	BE	1992	<100	G	
17	ST/963.033	Badbury Rings	SNCI	BE	1996	100+	G	
18	ST/900.120	Handcocks Bottom	SSSI	RWD	1990	100+	G	
19	ST/903.183	Boyne Bottom	SNCI	BE	1992	100+	G	
20	ST/920.075	Blandford Camp	SSSI	RWD, DP	1990	1,000+	–	T
21	ST/915.075	Blandford Camp	–	RWD, DP	1990	100+	M	
22	ST/918.083	Blandford Camp	–	RWD, DP	1990	100+	M	
23	ST/927.084	Blandford Camp	SSSI	RWD, DP	1990	1,000+	G	
24	ST/927.094	Blandford Camp	SNCI	DP, DS	1993	<10	–	T
25	ST/910.146	Stubhampton Bottom	SNCI	BE	1992	<50	G	
26	ST/917.103	Pimperne Long Barrow	SNCI	DP	1991	<100	–	T
27	ST/968.124	Thickthorn Down, N of road	SNCI	DP	1990	100+	G	
28	ST/970.123	Thickthorn Down, S of road	SNCI	DP	1990	3	–	T
29	ST/993.107	Sovell Down	SNCI:DWT	DP	1990	<1,000	(G)	
30	ST/988.144	Gussage Down	SNCI	RWD, DP	1990	1,000+	–	
31	ST/997.143	Gussage Down	SNCI	RWD, DP	1990	1,000+	–	
32	ST/995.135	Gussage Down	SNCI	DP	1990	<100	–	T

TABLE 1. (continued)

Grid reference	Site name	Conservation status	Recorders	Date of last visit	Number of plants	Management	Threat
33 SU/004.136	Harley Gap	SNCI	DP	1991	<20	–	T
34 SU/001.136	Harley Gap – tumulus	SNCI	GF	1991	<10	–	T
35 SU/005.140	Harley Gap	SNCI	DP	1991	<10	–	T
36 SU/008.123	Tenantry Down	SNCI	RWD, DP	1992	<1,000	–	(T)
			BE	1995	100+	–	
37 SU/011.166	Handley Hill Roundabout	SNCI	NS	1991	<10	–	T
38 SU/012.173	Handley Down – Longbarrow	SNCI	NS	1991	<10	–	T
39 SU/015.163	Ackling Dyke – 3 patches	SNCI	NS	1991	<100	–	T
			BE	1995	<1,000	–	
40 SU/019.174	Oakley Down – tumulus	SNCI	DP	1990	<100	G	
			BE	1995	<1,000	G	
41 SU/022.168	Oakley Down – bank to E	SNCI	NS	1991	100+	–	
42 SU/024.103	Knowlton Church	SNCI	DP	1990	<100	–	
			BE	1995	100+	–	
43 SU/039.164	Pentridge Down – bridleway	–	BE	1992	<10	–	T
44 SU/038.173	Pentridge Down	SNCI	DP	1994	10,000+	G	
45 SU/042.174	Pentridge Down	SNCI	DP	1994	10,000+	G	
46 SU/043.180	Pentridge Down	SNCI	DP, RW	1991	<100	G	
47 SU/040.158	Blackbush Down	SNCI	RWD	1987	<100	–	T
			GF	1991	<20	–	
48 SU/041.188	Bokerley Dyke – long barrow to S	SNCI	DP, RF, RW	1991	<100	G	
49 SU/037.196	Bokerley Dyke – main bank	SNCI	DP, RF, RW	1991	1,000+	–	
50 SU/041.195	Bokerley Dyke – main bank	SNCI	DP, RF, RW	1991	100+	–	
51 SU/042.190	Bokerley Dyke – main bank	SNCI	DP, RF, RW	1991	100+	–	
52 SU/045.189	Bokerley Dyke – main bank	SNCI	DP, RF, RW	1991	100+	–	
53 SU/049.188	Bokerley Dyke – main bank	SNCI	DP, RF, RW	1991	100+	–	
54 SU/051.187	Bokerley Dyke	SNCI	DP, RF, RW	1991	100+	–	
55 SU/053.181	Bokerley Dyke – Blagdon Gap	SNCI	DP, RF, RW	1991	1,000+	–	
56 SU/056.180	Bokerley Dyke – Blagdon Hill	SNCI	DP, RF, RW	1991	<100	–	(T)

Recorders: H. J. M. Bowen (HJMB); R. W. David (RWD); B. Edwards (BE); G. Field (GF); R. FitzGerald (RF); D. Pearman (DP); D. Stephens (DS); N. Stewart (NS); R. Walls (RW).
Conservation status: Dorset Wildlife Trust (DWT); National Trust (NT); Site of nature conservation interest (SNCI).
Management: Grazed (G); Mown (M).
Threat to site: T.

TABLE 2. DETAILS OF *CAREX HUMILIS* EXTINCT SITES IN DORSET (V.C. 9)

Grid reference	Site name	Last record (P = Published)	Present research Recorders**	Date	Fate of site
SY/823.989	Deverell Down	1971	RWD, DP, RF	1992	Ploughed/scrubbed over
ST/817.098	Okeford Hill	P 1905	RWD, DP, RF	1992	Ploughed/rank
ST/88.08	Nutford	P 1939	DP	1991	Arable
ST/879.192	Melbury Hill	*	RWD, DP	1990	The site is extant and grazed
			DP	1993	
ST/898.127	Handcocks Bottom	1978	RWD	1990	Ploughed
ST/958.109	Long Critchel	ex RWD card index <1920	RWD	1978	Ploughed
	Whitsbury Gallops	ex RWD card index <1920	RWD	1978	Ploughed
ST/96.05	Hemsworth Down	P 1919	DP	1991	Arable
ST/96.09	Long Critchel, Horse Down	P 1895	DP	1991	Arable
ST/901.115	Gunville Down	1978	RWD	1990	Ploughed
ST/954.118	Tarrant Hinton Down	1976	RWD	1992	Ploughed
ST/942.147	Chettle Down	P 1895	DP, RF	1991	Ploughed (in 1950s)
ST/96.13	Week St Down	P 1919	DP	1992	Ploughed (in 1970s)
ST/996.137	Gussage Down	1976	RWD	1992	Ploughed (in 1970s)
SU/00.15	Wick Down	P 1919	DP	1992	Ploughed

* There have been several published records for Melbury Hill, from W. R. Linton in 1905 up to 1983, but none has ever been confirmed, and the site has been omitted from the total.

** See Table 1.

been ploughed, I feel that if there are unrecorded historical losses, then these would have been on the more level sites.

Table 3 summarises the sites known in Dorset, and categorises them according to the size of the population in each site.

TABLE 3. INFORMATION OF THE KNOWN SITES OF *CAREX HUMILIS* IN DORSET

Status of sites	Number of sites	Number of plants at each site			
		<10	11–100	101–1000	1001+
Extant – not threatened	36		5	19	12
Extant – threatened	20	8	9	2	1
Extant – total	56	8	14	21	13
Extinct	15				

The species has been lost from 14 known sites as follows:

Last record before 1900	2 sites
1901–1920	6 sites
1921–1950	1 sites
1951–1970	0 sites
1971–1995	5 sites

Of the sites recorded before 1900, and between 1900 and 1920, some or most may well have survived until the 1950s or even the 1970s. Until Dick David started recording in 1971, there is little published information, but the above data suggest an increasing loss of sites.

There have been a few other recent detailed investigations of loss of sites relating to particular species. *Orchis ustulata* was shown to have disappeared from as many as 200 sites out of about 317 sites identified in southern England (Foley 1990). *Cardamine bulbifera* on the other hand was shown to be still present in about 155 sites out of a possible 200 sites in England (Showler & Rich 1993). The history of a woodland species, *Primula elatior*, has been documented for Cambridgeshire (Preston 1993, Preston & Yates 1995), showing little loss since 1950; plants have been found since 1991 at 68 out of 76 sites recorded since 1660! These studies seem to show that, despite the almost total neglect of British woodlands since the war, plants have survived better there than in grassland.

ACKNOWLEDGMENTS

I would like to thank all those who accompanied me for their help and perseverance, especially Bryan Edwards who can spot *C. humilis* at all times of the year. Of course I would particularly like to mention the help and encouragement I received from Dick David. Each spring another letter would arrive suggesting visiting some other "old" site. He would stay at a hotel in the middle of *C. humilis* territory, and would invariably visit other sites on the way down and back. One year we had walked all day, it was raining and we were a long way from the car. He asked if we could rest for a moment, explaining that he was going to be 80 in a few weeks time. I had always marked him as years younger! I was able to show him a few new sites and in 1993 he was actually to come and stay; a great honour. Two weeks before his intended arrival I opened *The Times* and found his obituary. Like many other members I am delighted to hold a whole stack of his meticulous letters, all of which impart encouragement and information in equal measure.

REFERENCES

Foley, M. J. Y. (1990). The current distribution and abundance of *Orchis ustulata* L. in southern England. *Watsonia* **18**: 37–48.

Preston, C. D. (1993). The distribution of the Oxlip *Primula elatior* (L.) Hill in Cambridgeshire. *Nature in Cambridgeshire* **35**: 29–60.

Preston, C. D. & Yates, S. E. (1995). Further localities for the Oxlip *Primula elatior* (L.) Hill in Cambridgeshire. *Nature in Cambridgeshire* **37**: 35–41.

Shower, A. J. & Rich, T. C. G. (1993). *Cardamine bulbifera* (L.) Crantz (Cruciferae) in the British Isles. *Watsonia* **19**: 231–245.

Stewart, A., Pearman, D. A. & Preston, C. D. (1994). *Scarce plants in Britain.* Joint Nature Conservation Committee, Peterborough.

D. Pearman
The Old Rectory, Frome St Quintin, Dorchester, Dorset, DT2 0HF

THE TAXONOMIC STATUS OF *DACTYLORHIZA MAJALIS* (RCHB. FIL.) P. F. HUNT & SUMMERH. SUBSP. *TRAUNSTEINERI* (SAUT. EX RCHB. FIL.) H. SUND. VAR. *BOWMANII* M. N. JENK.

Jenkinson (1995) recently described a new variety, var. *bowmanii* of *Dactylorhiza traunsteineri* (Sauter ex Rchb.) Soó (= *D. majalis* subsp. *traunsteineri*) from S. Hants. (v.c. 11).

Jenkinson's conclusions were based upon a comparison of morphometric data from three populations in Hampshire (Exbury, Avon Forest Park and Mapledurwell Fen) with data from five populations of *D. traunsteineri* in widely separated localities in Berks., v.c. 22, Anglesey, v.c. 52 and Mid-West Yorks., v.c. 64. At all three Hampshire sites, the populations sampled by Jenkinson were accompanied by *D. praetermissa* (Druce) Soó and *D. fuchsii* (Druce) Soó, with *D. maculata* (L.) Soó in addition at Avon Forest Park and putative hybrids at the other two (Jenkinson 1995).

As a result of this study he concluded that "for the vast majority of character states the three Hampshire populations from which data have been obtained fall within the parameters of subsp. *traunsteineri* according to accepted morphological criteria". (For reasons given in his paper Jenkinson prefers to treat *D. traunsteineri* as a subspecies of *D. majalis* (Rchb.) P. Hunt & Summerh.).

The main diagnostic characters of *D. traunsteineri* are: its slender, usually flexuous stem; the reddish-purple colouration of the upper part of the stem and bracts; its few, narrow, linear-lanceolate leaves (usually 3–4 including 0–1 non-sheathing leaves); its lax, few-flowered (c. 7–12), usually sub-secund inflorescence, and its rather large flowers, with broad (c. 10 mm) labella, whose lateral lobes are semi-reflexed (Pugsley 1936; Heslop-Harrison 1953; Lacey & Roberts 1958; Roberts 1960; Tennant 1979; Bateman & Denholm 1983; Foley 1990).

Jenkinson's sample data for some of these characters are shown in our Table 1, in which we have included the "Total number of leaves" obtained by adding his means for the "No. of sheathing leaves" and "No. of non-sheathing leaves". The means in each row have been arranged in order of magnitude so that the range of values for the *D. traunsteineri* "control" samples and "var. *bowmanii*" can be read at a glance.

TABLE 1. POPULATION MEANS OF *DACTYLORHIZA* TAXA FROM JENKINSON (1995) (TABLE 3)

	D. traunsteineri (control samples)	"var. *bowmanii*"	Mapledurwell population
No. of sheathing lvs	2·2, 2·6, 2·6, 2·7, 2·8	3·0, 3·5	3·0
No. of non-sheathing lvs	0·4, 0·7, 0·7, 1·0, 1·0	1·4, 1·9	1·0
Total no. of lvs	3·1, 3·2, 3·3, 3·5, 3·6	4·4, 5·4	4·0
Length of longest leaf (cm)	6·50, 6·59, 7·55, 8·25, 10·02	10·51, 12·81	9·99
Width of widest leaf (cm)	0·93, 1·07, 1·09, 1·26, 1·36	2·03, 2·25	1·37
No. of fls/inflorescence	8·0, 8·7, 9·2, 9·4, 12·0	16·8, 19.1	9·6
Stem diameter (mm)	2·30, 2·40, 2·60, 2·65, 3·50	3·90, 4·45	2·60

Jenkinson's data from the Mapledurwell population agreed very closely with those from the "control" populations of *D. traunsteineri* and from this he concluded that it is indeed *D. traunsteineri*, in spite of the fact that the mean value for "Total no. of leaves" (a diagnostic character) lies outside the range of his "control" means.

The case of the Exbury and Avon Forest Park samples ("var. *bowmanii*") is rather different. All the mean values from these populations, shown in our Table 1, lie outside, in some cases well outside, the upper values of the *D. traunsteineri* "controls" as may be seen in our Fig. 1. Furthermore, most of these are diagnostic characters in the determination of this species and the claim that these two populations are sufficiently close to *D. traunsteineri* to warrant inclusion in that taxon clearly has no justification.

In addition, Jenkinson's drawings (Fig. 1, p. 267) of unpressed plants of his "var. *bowmanii*", which he subsequently preserved as the nomenclatural *type*, are inconsistent with our experience of living plants referred to *D. traunsteineri*. In particular, the former are depicted as being somewhat robust, straight-stemmed and distinctly leafy, the leaves themselves relatively broad and deeply channelled and in some cases cucullate, and the inflorescences dense-flowered. Similarly, drawings (Jenkinson (1995), Fig. 2, p. 270) of the labella of plants from two populations of "var. *bowmanii*", whilst consistent among themselves, are atypical of *D. traunsteineri* in their patterning and almost entirely in their shape, and in fact none of the above characters suggest that Jenkinson's plants are related to this taxon.

In the British Isles, *D. traunsteineri* invariably occurs in damp, calcareous fens and flushes of which it can sometimes be an abundant and typical component. In populations where the pH has been measured, values within the range 7·0–8·0 have been recorded (Heslop-Harrison 1954; Tennant 1979); on occasion some habitats are found to be especially base-rich with considerable déposits of tufa. Whilst the Exbury site is wet, it is clearly slightly acidic and is becoming overgrown

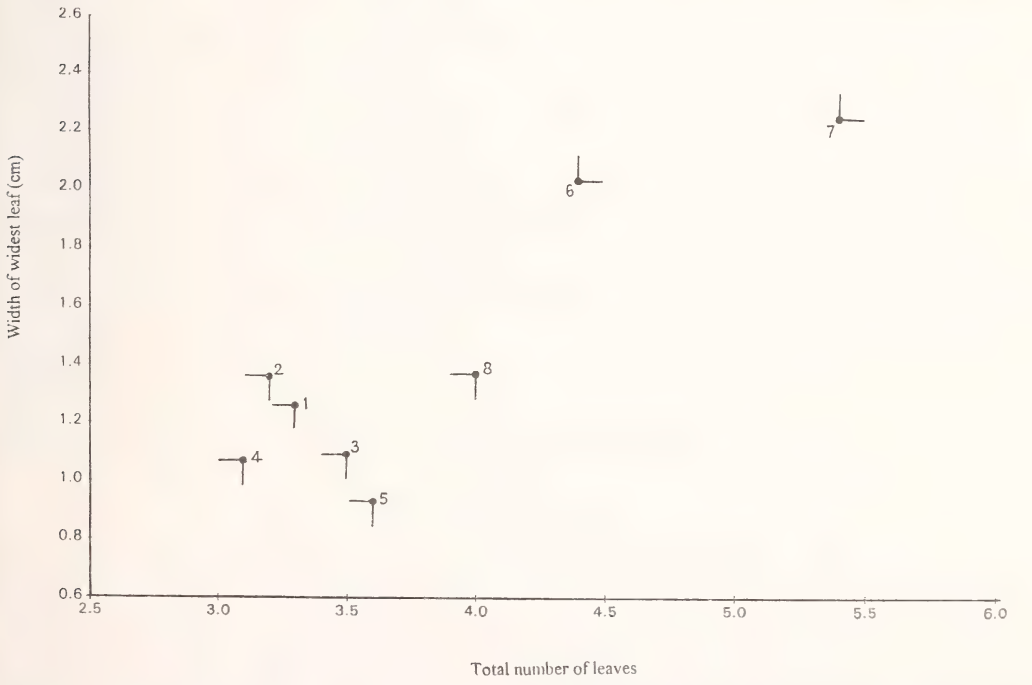


FIGURE 1. Eight populations of *Dactylorhiza* taxa (data taken from Jenkinson (1995)) showing variation in two diagnostic characters (width of widest leaf and total number of leaves). Two further characters are included: mean number of flowers per inflorescence (12 or less ●; more than 12 ▲); and mean number of non-sheathing leaves (1·0 or less –●; more than 1·0 ●–). Populations 1–5: *D. traunsteineri*; 6: Exbury; 7: Avon Forest Park; 8: Mapledurwell.

with *Pteridium aquilinum* (L.) Kuhn. The other three localities given for "var. *bowmanii*" by Jenkinson (1995) are also in acidic habitats, but this time in dry grassland. Again they are in association with other acid-soil plants and their presence in such habitats is clearly at variance with those known for *D. traunsteineri*.

The evidence against including these populations in *D. traunsteineri* is thus overwhelming and their true identity must be looked for elsewhere. A similar error was made by Pugsley (1946) who reported *Orchis traunsteinerioides* from Greywell Fen near Odiham. Heslop-Harrison (1953) investigated this population and his description is worth quoting: "In the highly polymorphic *O. praetermissa* population of this fen there are individuals which approach the *O. Traunsteineri* range in sparsity and narrowness of leaves, and in the labellum shape and pattern, but nothing has been found in this locality comparable, for example, with the very distinctive Cothill Fen colony". It will be recalled that the Cothill Fen population is one of those used by Jenkinson (1995) as a *D. traunsteineri* "control". It thus seems highly probable that the plants described by Jenkinson as "var. *bowmanii*" are similar to the sparse- and narrow-leaved plants in Greywell Fen, and like them, too, are variants of the local *D. praetermissa* population.

It is also clear that the "morphological overlap" between two marsh-orchid taxa, assumed by Jenkinson (1995) in the introduction to his paper, and on which he bases his support for the subspecific status of *D. traunsteineri*, does not, in fact, exist.

REFERENCES

Bateman, R. M. & Denholm, I. (1983). A reappraisal of the British and Irish dactylorchids, 1. The tetraploid marsh-orchids. *Watsonia* **14**: 347–376.

Foley, M. J. Y. (1990). An assessment of populations of *Dactylorhiza traunsteineri* (Sauter) Soó in the British Isles and a comparison with others from continental Europe. *Watsonia* **18**: 152–172.

Heslop-Harrison, J. (1953). Studies in *Orchis* L., II. *Orchis traunsteineri* Saut. in the British Isles. *Watsonia* **2**: 371–391.

Heslop-Harrison, J. (1954). A synopsis of the dactylorchids of the British Isles. *Bericht über das geobotanische Forschungsinstitut Rübel in Zürich* **1953**: 53–82.

Jenkinson, M. N. (1995). A new variety of Narrow-leaved Marsh-orchid in South Hampshire (v.c. 11). *Watsonia* **20**: 263–273.

Lacey, W. S. & Roberts, R. H. (1958). Further notes on *Dactylorchis traunsteineri* (Saut.) Vermeul. in Wales. *Proceedings of the Botanical Society of the British Isles* **3**: 22–27.

Pugsley, H. W. (1936). New British Marsh Orchids. *Proceedings of the Linnean Society of London* **148**: 121–125.

Pugsley, H. W. (1946). *Orchis traunsteinerioides* Pugsl. in Britain. *Naturalist, Hull* **1946**: 47.

Roberts, R. H. (1960). The Wicklow marsh orchid in Anglesey. *Nature Wales* **6**: 14–17.

Tennant, D. J. (1979). *Dactylorhiza traunsteineri* in Yorkshire. *Naturalist, Hull* **104**: 9–13.

R. H. Roberts
51 Belmont Road, Bangor, Gwynedd, LL57 2HY
M. J. Y. Foley
Department of Biological Sciences, University of Lancaster, Lancaster, LA1 4YQ

ASPLENIUM VIRIDE HUDSON (ASPLENIACEAE) IN GREATER LONDON

The Boreal-Montane *Asplenium viride* Hudson (syn. *A. trichomanes-ramosum* L. = *A. ramosum* L., Zimmer & Greuter 1994), is in terms of gross morphology i.e. size, frond dissection, etc. similar to another congeneric calcicole, *A. trichomanes* L. subsp. *quadrivalens* D. E. Meyer emend. Lovis but whereas the latter is a frequent colonist of walls, the former is notably absent from this habitat (Page 1982). It was therefore with some surprise that *A. viride* was detected growing on a trackside wall at Ravenscourt Park station, Middlesex, v.c. 21 (TQ/225.787) in April 1995. Two clumps were initially seen from the rear coach of a passing train, one c. 15 cm. in diameter and obviously present for many years, the other much smaller and giving the appearance of being recently established,

presumably as spores from the larger clump which is less than 1 m away. The site faces west to south-west but is somewhat shaded as it occurs in a small alcove housing signalling equipment, which acts to give additional shelter. Several small plants of *Asplenium scolopendrium* L. occur with the *A. viride* on an otherwise unremarkable, dry, mortared brick wall.

The very dry summer of 1995 proved highly damaging to many wall fern populations and it was with some trepidation that the fern was viewed en passant in late July, by a party of pteridologists following the Holttum conference at Kew. Both clumps were showing signs of drought stress, with browning of the distal portions of the majority of fronds. By December 1995 both appeared to have recovered but the larger clump was being overgrown by a plant of *A. scolopendrium*, which may ultimately cause its demise.

The closest extant natural populations of *A. viride* which could have acted as a spore source are c. 160 km away in a similar situation on a blue brick railway bridge near Loughborough, Leics., v.c. 55 (Primavesi & Evans 1988), although plants cultivated by enthusiasts and in botanic gardens occur closer. The nearest indisputably native populations exist on sheltered upland limestone in Glamorgan and Brecon and in the Derbyshire dales. Jermy *et al.* (1978) gave no records in the S.E. of England, however, last century the species occurred in at least two sites. Moore (1852) reported on the discovery of a single plant on "an old brick wall forming a parapet to a cellar window" at Danny House, c. 10 miles [16 km] from Brighton, W. Sussex, v.c. 13 (TQ/284.149). The plant's origin was the cause of some debate (Anon. 1853) with John Ray, who had stayed at the property for some months 184 years before, named as a possible source! The species did not persist for long, being reported as lost by 1860 (Wolley-Dod 1937). The species proved more tenacious in another Victorian site in S.E. England, a shaded brick wall, by riding stables, at Mickleham in Surrey, v.c. 17 (TQ/1.5), where it persisted from its discovery in 1854 until c. 1889 (Lousley 1976).

All of the species' occurrences at its extremes of distribution in lowland eastern and central England seem to have been on walls. For example, in addition to the records mentioned above, the species was also found in 1860 on the wall of Toynton St Peter church, Lincs., v.c. 54 (TF/403.634) (Gibbons 1975) and its discovery, apparent loss when whitewashed in 1827, reappearance by 1836 and ultimate loss in 1853 from a wall in Worcestershire, was documented by Amphlett & Rea (1909).

The lack of suitable rock substrates in lowland England means that colonization by spores is only possible on these man-made habitats. Most such colonizations are inevitably short lived as the species is only able to persist where it is cool and humid in summer (Page 1982), although there obviously exists considerable variation between individuals in respect to their tolerance to these important environmental variables. Other montane fern species have also produced occasional outliers on walls, e.g. *Asplenium septentrionale* on Romney Marsh, E. Kent, v.c. 15 (Philp 1982) and *Polystichum lonchitis* near Wellingborough, Northants., v.c. 32 (Jermy *et al.* 1978). Railways seem particularly associated with these disjunct fern colonizations. The congenial humid atmosphere associated with steam propulsion has been noted in the past as one reason for this correlation but this has clearly been an inadequate explanation over the last two decades!

REFERENCES

Amphlett, J. & Rea, C. (1909). *Flora of Worcestershire*. Cornish Bros. Ltd, Birmingham.

Anon. (1853). *Asplenium viride* at Danny. *Phytologist* **4**: 946–947.

Gibbons, E. J. (1975). *The Flora of Lincolnshire*. Lincolnshire Naturalists' Union, Lincoln.

Jermy, A. C., Arnold, H. R., Farrell, L. & Perring, F. H. (1978). *Atlas of ferns of the British Isles*. The Botanical Society of the British Isles & The British Pteridological Society, London.

Lousley, J. E. (1976). *Flora of Surrey*. David & Charles, Newton Abbott.

Moore, T. (1852). *Asplenium viride* in a quasi-spontaneous condition near Brighton. *Phytologist* **4**: 842–843.

Page, C. N. (1982). *The ferns of Britain and Ireland*. Cambridge University Press, Cambridge.

Philp, E. C. (1982). *Atlas of the Kent flora*. Kent Field Club, Maidstone.

Primavesi, A. L. & Evans, P. A. (1988). *Flora of Leicestershire*. Leicestershire Museums, Art Galleries and Records Service, Leicester.

Wolley-Dod, A. H. (1937). *Flora of Sussex*. Kenneth Saville, Hastings.
Zimmer, B. & Greuter, W. (1994). (1093) Proposals to reject the name *Asplenium ramosum* L. (Pteridophyta). *Taxon* **43**: 303–304.

F. J. Rumsey
Cryptogamic Plants Division, Department of Botany, Natural History Museum, Cromwell Road, London, SW7 5BD

THE DISTRIBUTION OF BRAMBLES (*RUBUS* SPP.) IN NORTH-EAST SCOTLAND

Comprehensive knowledge about the occurrence of brambles (*Rubus* spp., Rosaceae) in Aberdeenshire and Kincardineshire has built up over the last ten years. Numerous species have been added to the vice-county lists given in Edees & Newton (1988), and many species have been found to have wider ranges than the maps in that work indicate. A full list of the species currently known in v.cc. 91–93 is given in Table 1, together with the number of hectads and part-hectads in which they occur in each vice-county.

Rubus mucronulatus Boreau is by far the commonest bramble in all three vice-counties, contributing 90–99% of the bramble occurrences in most hectads. *R. mucronulatus* extends higher in altitude than any other species, reaching 275 m in Crathie in S. Aberdeen (v.c. 92) and 215 m in Forgie in N. Aberdeen (v.c. 93). These quite low altitudinal limits mean that brambles are absent from roughly half the total area comprised by v.cc. 91–93, and along many upland roads raspberries are the sole *Rubus* species.

Other widespread brambles have altitudinal limits between 150 and 200 m, and many species are confined to the coastal plain, growing no higher than 100 m. Current altitudinal limits for the widespread species are, in ascending order: 155 m *R. polyanthemus* Lindeb., 165 m *R. furvicolor* Focke, 175 m *R. dasyphyllus* (Rogers) E. S. Marshall, 185 m *R. latifolius* Bab., and 200 m *R. echinatoides* (Rogers) Dallman and surprisingly *R. ulmifolius* Schott. However, this last is a disjunct occurrence at Kennethmont less than a kilometre from the Aberdeen – Inverness railway.

Three species are abundant over limited areas within north-east Scotland, *R. furvicolor* in the Turriff – Fraserburgh district of v.c. 93 (Welch 1993), *R. septentrionalis* W. C. R. Watson south of Fraserburgh, and *R. echinatoides* near Crimond (v.c. 93) and also in the lower Dee valley around Banchory (v.c. 91) in hectads NO/6.9 and NO/7.9. In all but the last of these areas *R. mucronulatus* is infrequent.

For Buchan (the north-eastern half of Aberdeenshire) Trail (1904) reported that *R. furvicolor* (= *melanoxylon*) was common, but he considered *R. mucronulatus* was scarce throughout the area in contrast to its abundance near Aberdeen. It would appear that *R. mucronulatus* has spread north in the last 90 years, but has gained surprisingly little ground, considering its vigour, where *R. furvicolor*, *R. septentrionalis* and *R. echinatoides* were already common. Other species now locally frequent in Buchan are *R. anisacanthos* G. Braun around Old Deer, and *R. dasyphyllus* around Clola.

The richest habitats for brambles in north-east Scotland are railways, particularly their stations and goods yards. The Deeside line, abandoned in 1966, once carried frequent suburban services, and in its first 14 km west of Aberdeen there were eight stations. This line has been developed into a cycleway and the station areas are largely intact; eight species including unnamed taxa are currently known at Milltimber (Ballantyne 1996) and two others grow at Cults nearby. Across the region *R. elegantispinosus* (A. Schum.) H. E. Weber, *R. errabundus* W. C. R. Watson, *R. leptothyrsos* G. Braun and *R. ulmifolius* have more of their occurrences along railways than might be expected on chance, and very probably reached north-east Scotland either by being planted by railwaymen in their lineside allotments, or by passive carriage on trains. Similarly *R. plicatus* Weihe & Nees and *R. scissus* W. C. R. Watson have an undue number of occurrences on banks by old roads e.g. *R. scissus* on the old Aberdeen – Tarves road, and perhaps were spread by road traffic in the past. But these species are typical of moorland and may well be relicts, the narrow strips along roads containing the only surviving remnants of moorland in these places.

Five brambles are included in Table 1 which appear not to have been described or named (A. Newton, pers. comm., 1996). Three of these grow by railways and have as yet only one or two

TABLE 1. NUMBER OF HECTADS AND PART-HECTADS IN WHICH BRAMBLE SPECIES (*RUBUS* SPP.) OCCUR IN VICE COUNTIES 91–93

	91	92	93
SUBERECTI			
R. fissus Lindley	2	2	1
R. plicatus Weihe & Nees	1		3
R. scissus W. C. R. Watson	4	3	3*
SYLVATICI			
R. errabundus W. C. R. Watson			1
R. leptothyrsos G. Braun			5
RHAMNIFOLII			
R. elegantispinosus (A. Schum.) H. E. Weber	1	2*	1*
R. lindebergii Mueller			1
R. nemoralis Mueller		1*	1*
R. polyanthemus Lindeb.	3		2
R. rhombifolius Weihe ex Boenn.			1*
R. septentrionalis W. C. R. Watson		2*	12
DISCOLORES			
R. procerus Mueller ex Boulay	4	2*	2*
R. ulmifolius Schott	2		5*
VESTITI			
R. vestitus Weihe in Bluff & Fingerh.	1*		2*
MUCRONATI			
R. furvicolor Focke		2	23
R. mucronulatus Boreau	16	21	24
Unnamed[1]	1		
Unnamed[2]		1	
MICANTES			
R. raduloides (Rogers) Sudre in Gandoger			1*
ANISACANTHI			
R. anisacanthos G. Braun			5*
R. infestus Weihe ex Braun	1		2*
RADULI			
R. echinatoides (Rogers) Dallman	13	11	5
R. radula Weihe ex Boenn.	5*	1*	2
Unnamed[3]		1	
HYSTERICES			
R. dasyphyllus (Rogers) E. S. Marshall	4*		12*
CORYLIFOLII			
R. latifolius Bab.	12	10	14
R. pictorum Edees	3*	1*	
R. tuberculatus Bab.	2*	2*	1*
Unnamed[4]			2
Unnamed[5]	1		
Number of species (named)	16	13	24
Number of species (including unnamed)	18	15	25

* Not recorded for vice-county in Edees & Newton (1988).
[1] Probably a hybrid of *R. mucronulatus* and *R. latifolius*.
[2] With large ternate leaves and white flowers.
[3] Similar to *R. largificus* but with very short stamens.
[4] With strong heterocanth prickles and pinkish flowers.
[5] With weak prickles and white flowers.
Based largely on records made by the author since 1982, but including also some records of Alan Newton published in Edees & Newton (1988) and a few recent records of George Ballantyne in v.c. 92.

localities, and a fourth is a single large patch, being apparently a hybrid of *R. mucronulatus* and *R. latifolius* (A. Newton, pers. comm., 1996), which fruits badly. Only the pink-flowered Corylifolian allied to *R. tuberculatus* Bab., that grows around Peterhead in eight separate 1-km squares (Welch 1993), is sufficiently widespread to be a candidate for naming.

Many of the extra species now added to the vice-county lists have probably been present for many years, unnoticed because searching was previously minimal. Most occur in neighbouring vice-counties although *R. vestitus* Weihe in Bluff & Fingerh. and *R. anisacanthos* are apparently far distant from other locations. The latter grows in large thickets in plantations on former heathland, and extends for 200 m along one roadside in Buchan, so having the appearance of being long resident.

The total list for north-east Scotland would seem to be virtually complete. Only four further species grow in vice-counties adjacent to the region; of these just *R. conjungens* (Bab.) Rogers, *R. laciniatus* Willd. and *R. nessensis* W. H. Hall are candidates for occurrence. The fourth species, *R. hebridensis* Edees, is known only from one roadside near Dufftown (v.c. 94) at the surprising altitude of 240 m, and is almost certainly a recent introduction which the mild winters of the 1990s have permitted to survive. However, some additions to the lists for v.cc. 91 and 92 are still likely: it is puzzling that *R. furvicolor* and *R. septentrionalis* can be so abundant in the far north yet are unknown in Kincardineshire in apparently similar situations.

ACKNOWLEDGMENTS

I am most grateful to Alan Newton for examining some 250 specimens, and teaching me how to recognise species. I have had useful discussions with George Ballantyne on species behaviour and distribution.

REFERENCES

Ballantyne, G. H. (1996). Aberdeenshire brambles. *Botanical Society of Scotland newsletter* **66**: 9–10.
Edees, E. S. & Newton, A. (1988). *Brambles of the British Isles*. Ray Society, London.
Traill, J. W. H. (1904). The flora of Buchan – its distribution, origin and relations to man. *Transactions of the Buchan Field Club* **8**: 2–56.
Welch, D. (1993). *Flora of North Aberdeenshire*. Privately published, Banchory.

D. Welch
East Fernbank, Woodside Road, Banchory, Kincardineshire, AB31 5XL

Plant Records

Records for publication must be submitted to the appropriate Vice-county Recorder (see *B.S.B.I. Year Book 1997*), and *not* the Editors. The records must normally be of species, hybrids or subspecies of native or naturalised plants belonging to one or more of the following categories: 1st or 2nd v.c. record; 1st or 2nd post-1930 v.c. record; only extant v.c. locality, or 2nd such locality; a record of an extension of range by more than 100 km. Such records will also be accepted for the major islands in v.cc. 102–104 and 110. Only 1st records can normally be accepted for *Rubus*, *Hieracium* and hybrids. Records for subdivisions of vice-counties will not be treated separately; they must therefore be records for the vice-county as a whole. Records of *Taraxacum* are now being dealt with separately, by Dr A. J. Richards, and will be published at a later date.

Records are arranged in the order given in the *List of vascular plants of the British Isles* by D. H. Kent (1992), from which the species' numbers, taxonomy and nomenclature are taken. The Ordnance Survey national grid reference follows the habitat and locality. With the exception of collectors' initials, herbarium abbreviations are those used in *British and Irish herbaria* by D. H. Kent & D. E. Allen (1984). Records are field records if no other source is stated.

Records from the following vice-counties are included in the text below: 1–6, 9–14, 17, 28, 29, 35, 38, 40–43, 45–53, 58, 59, 61, 62, 64, 66–68, 71, 73, 75, 77–80, 83, 86, 87, 91, 92, 94, 96, 97, 99, 108, 110, H1, H7, H15.

The following signs are used:

* before the record: to indicate a new vice-county record.

† before the species number: to indicate that the plant is not a native species of the British Isles.

† before the record: to indicate a species which, though native in some parts of the British Isles, is not so in the locality recorded.

[] enclosing a previously published record: to indicate that the record should be deleted.

4/1.5 × 8. EQUISETUM ARVENSE × E. PALUSTRE (E. × ROTHMALERI) ***83**, Midlothian: Marsh, Moorfoot Hills, NT/396.484. C. Dixon, 1994, **E**, det. C. N. Page.

4/1.6 × 7. EQUISETUM PRATENSE × E. SYLVATICUM (E. × MILDEANUM) ***83**, Midlothian: Riverside, Penicuik estate, NT/246.604. C. Dixon, 1994, **E**, det. C. N. Page.

7/3.1. ADIANTUM CAPILLUS-VENERIS †***5**, S. Somerset: Walls, Chard, ST/326.079. I. P. Green, 1995.

9/1.1. PILULARIA GLOBULIFERA ***64**, Mid-W. Yorks.: Edge of Lumley Moor Reservoir, SE/220.708. D. R. Grant, 1994. **99**, Dunbarton: Muddy runnels and shallow water between S. end of Geal Loch and Ardleish, NN/318.162. J. Mitchell & A. McG. Stirling, 1995. **GLAM**. 1st localised record.

11/1.1 × 2. POLYPODIUM INTERJECTUM × P. VULGARE (P. × MANTONIAE) ***62**, N.E. Yorks.: Trunk of fallen ash, Carr Wood, NX/823.015. K. Trewren, 1994, det. A. M. Paul.

11/1.2. POLYPODIUM INTERJECTUM ***58**, Cheshire: Walls and lanebank, Burton, SJ/31.74. E. F. Greenwood, 1995. **herb. G. M. Kay**, det. R. H. Roberts. Bank, Barnston, SJ/27.83. E. F. Greenwood. 1st and 2nd records.

11/1.3. POLYPODIUM CAMBRICUM **13**, W. Sussex: Castle walls, Amberley Castle, TQ/027.132. P. D. Stanley, 1995, **herb. M. Briggs**, det. R. H. Roberts. 2nd record, 1st since 1837.

15/2.4. ASPLENIUM MARINUM **58**, Cheshire: Sandstone cliff, Wallasey, SJ/298.940. D. P. Earl, 1995. 2nd record.

15/2.8. ASPLENIUM SEPTENTRIONALE **108**, W. Sutherland: Cliff, Gleannan a Mhadaidh, 1991. W. Henderson & A. Scott, 1991. 2nd record.

16/5.2. CYSTOPTERIS DICKIEANA ***96**, Easterness: Rocky gorge, Cairngorms, NH/8.0. D. J. Tennant, 1993, **E**, conf. R. H. Roberts.

17/1.1. POLYSTICHUM SETIFERUM ***87**, W. Perth: Blairlogie, NS/833.968. L. & E. Smith, 1993, **BM**, det. A. M. Paul.

17/3.1 × 2. DRYOPTERIS FILIX-MAS × D. OREADES (D. × MANTONIAE) *46, Cards.: Wall of disused mine building, Bwlch-glas leadmine, SN/710.877. S. P. Chambers, 1994, **NMW**, conf. H. V. Corley.

17/3.2 × 3. DRYOPTERIS AFFINIS × D. FILIX-MAS (D. × COMPLEXA) *3, S. Devon: Hedgebank, Wembury, SX/538.492. L. J. Margetts & L. M. Spalton, 1994, **herb. L.J.M.**, det. H. V. Corley. *58, Cheshire: Wooded track, Middlewood, SJ/945.850. B. Porter, 1992.

17/3.8 × 9. DRYOPTERIS CARTHUSIANA × D. DILATATA (D. × DEWEVERI) *62, N.E. Yorks.: Open moorland at edge of bog, Moordale Bog, NZ/572.172. K. Trewren, 1994.

†19/1.1. AZOLLA FILICULOIDES *75, Ayrs.: Pond near A77 road, Monkton, NS/370.290. J. Blane, 1993, conf. A. McG. Stirling.

26/2.2. NUPHAR PUMILA 73, Kirkcudbrights.: Loch Stroan, NX/644.703. O. M. Stewart, 1995. 1st post-1930 record but recorded here in 1905.

†28/3.3. HELLEBORUS ORIENTALIS *73, Kirkcudbrights.: Wooded area, St Mary's Isle, NY/673.487. O. M. Stewart & A. White, 1995.

†28/6.1 × var. ACONITUM NAPELLUS × A. VARIEGATUM (A. × CAMMARUM) *73, Kirkcudbrights.: Several clumps on rocks by R. Ken, Ken Bridge, NX/640.784. O. M. Stewart, 1995. *75, Ayrs.: Islet in R. Doon, Doonfoot, 1995. J. Blane, 1995, **GLAM**, conf. A. McG. Stirling.

†28/9.2. ANEMONE APENNINA 40, Salop: Verge of track, Llynclys Common, SJ/274.229. R. M. Stokes, 1994. 2nd record.

†28/9.hup. × vit. ANEMONE HUPEHENSIS × A. VITIFOLIA (A. × HYBRIDA) *46, Cards.: Retaining wall by road, Llangranog, SN/315.540. A. O. Chater & J. P. Woodman, 1995.

†28/12.4. CLEMATIS MONTANA *5, S. Somerset: Disused quarry, Fitzhead, ST/110.294. I. P. Green, 1994, det. A. C. Leslie.

28/13.4. RANUNCULUS SARDOUS 47, Monts.: Leadmine spoil, Fan near Llanidloes, SN/941.877. J. Bevan & W. A. Thompson, 1995. Only extant locality.

28/13.12. RANUNCULUS LINGUA †*96, Easterness: Roadside pond, Urchany, NH/886.489. J. Hex & V. Togner, 1995.

28/13.26. RANUNCULUS FLUITANS 50, Denbs.: River Alun, Rossett, SJ/382.565. G. Wynne, 1986, det. N. T. H. Holmes. Only extant locality.

28/17.3. THALICTRUM FLAVUM †73, Kirkcudbrights.: Edge of wood, Netherlaw, NX/74.45. O. M. Stewart & A. White, 1995. 1st post-1930 record.

†29/1.5. BERBERIS AGGREGATA *1, W. Cornwall: Gorse scrub near Pool, SW/674.408. D. T. Holyoak, 1993.

30/4.1. GLAUCIUM FLAVUM 51, Flints.: Waste ground near foreshore, Mostyn, SJ/163.806. G. Wynne, 1994. 2nd post-1930 record.

†31/1.1. DICENTRA FORMOSA 40, Salop: Edge of woodland, Brown Moss, SJ/563.392. R. M. Stokes, 1995. 2nd record.

†32/1.occ. × ori. PLATANUS OCCIDENTALIS × P. ORIENTALIS (P. × HISPANICA) *1, W. Cornwall: Self-sown saplings in woodland, Tehidy Woods, SW/64.43. D. T. Holyoak, 1993.

33/1.3 × 4. ULMUS MINOR × U. PLOTII (U. × VIMINALIS) *40, Salop: Old hedge by abandoned farmstead, Oswestry uplands, SJ/218.258. A. P. & R. A. Dawes, 1994, det. P. J. Bourne.

39/4.†2 × 6. QUERCUS CERRIS × Q. ROBUR *1, W. Cornwall: Self-sown sapling in scrub on mine spoil N. of Tolskithy, SW/681.428. D. T. Holyoak, 1994.

†40/2.2. ALNUS INCANA 38, Warks.: Reproducing extensively from planted trees in woodland, Wellesbourne, SP/262.531. J. W. Partridge, 1987, det. J. C. Bowra. 2nd record.

†41/1.1 PHYTOLACCA ACINOSA *40, Salop: Roadside verge near Kingsland Bridge, Shrewsbury, SJ/488.120. R. M. Stokes, 1994.

43/1.8. CHENOPODIUM POLYSPERMUM **59**, S. Lancs.: Weed in walled garden, Croxteth Hall, SJ/402.945. V. Gordon, 1995. Only extant locality.

43/3.2 × 3. ATRIPLEX GLABRIUSCULA × A. PROSTRATA *1, W. Cornwall: Sand at head of beach, Porthtowan, SW/691.479. D. T. Holyoak, 1993, **herb. D.T.H.**

43/3.2 × 4. ATRIPLEX LONGIPES × A. PROSTRATA (A. × GUSTAFSSONIANA) *1, W. Cornwall: Edge of creek in saltmarsh, Copperhouse Pool, Hayle, SW/566.381. D. T. Holyoak, 1993, **herb. D.T.H.** *59, S. Lancs.: Saltmarsh, mouth of R. Alt, Hightown, SD/286.036. V. Gordon, 1995, det. A. O. Chater & G. Halliday.

43/3.3 × 4. ATRIPLEX GLABRIUSCULA × A. LONGIPES (A. × TASCHEREAUI) *73, Kirkcudbrights.: Amongst *Phragmites australis* on mud, Nether Clifton, NX/91.55. O. M. Stewart, 1994, **E**.

43/3.4. ATRIPLEX LONGIPES **46**, Cards.: Rank vegetation at top of saltmarsh S. of Afon Teifi, Cardigan, SN/183.458. A. O. Chater, 1995, **NMW**. 2nd record.

43/6.1 × 2. SALICORNIA PUSILLA × S. RAMOSISSIMA *5, S. Somerset: Saltmarsh, Porlock Weir, SS/862.482. I. P. Green, 1995, conf. I. K. Ferguson.

43/6.2. SALICORNIA RAMOSISSIMA **58**, Cheshire: Inland saltmarsh, Neumann's Flashes, Northwich, SJ/667.650. G. M. Kay, 1993, det. I. K. Ferguson. 1st inland record.

†45/2.1. CLAYTONIA PERFOLIATA **52**, Anglesey: Sandy ground, Malltraeth, SH/402.687. P. Hope Jones, 1995. 2nd record.

†46/1.4. ARENARIA BALEARICA *64, Mid-W. Yorks.: Limestone scar, Ingleborough Hall estate, Clapham, SD/748.695. Yorkshire Naturalists' Union excursion, 1995.

46/8.1. MYOSOTON AQUATICUM †*46, Cards.: Weed in flowerbeds, Newman's Garden Centre, Capel Dewi, SN/625.823. S. P. Chambers, 1995. **80**, Roxburghs.: Woodland, Newstead, NT/541.341. J. Blane, 1994, **herb. R. W. M. Corner**. 1st record since 1870.

46/9.1. MOENCHIA ERECTA **41**, Glam.: Leached dune grassland near Porthcawl, SS/8.0. P. S. Jones, 1994, **NMW**. 2nd record. **46**, Cards.: Short turf in south-facing pasture, Wallog, SN/590.851. S. P. Chambers, 1995. 2nd extant locality.

46/10.1. SAGINA NODOSA **71**, Man: Margin of peaty pool, Lough Cranstal, NX/450.024. M. Devereau & L. S. Garrad, 1979. Still present in 1993. Only extant locality.

46/10.7a. SAGINA APETALA subsp. APETALA **51**, Flints.: Bare ground, Y Graig Nature Reserve, Tremeirchion, SJ/085.721. J. Green, 1994. 2nd record.

†46/18.1. LYCHNIS CORONARIA *40, Salop: Extensively naturalised outside caves near Bridgnorth, SO/728.936. S. O'Donnell, 1995.

46/25.7. DIANTHUS ARMERIA **51**, Flints.: Grassland on steep south-facing slope, Coed-y-felin Nature Reserve, Hendre, SJ/196.678. J. Green, 1994. 1st post-1930 record.

47/1.16. PERSICARIA MINOR *46, Cards.: Poached, muddy area where track crosses stream, E. side of Afon Teifi, Cors Caron National Nature Reserve, SN/689.634. A. O. Chater, 1994, **NMW**, det. J. R. Akeroyd. **59**, S. Lancs.: Draw-down zone, Upper Foulridge Reservoir, SD/893.413. P. Jepson, 1995. Only extant locality.

47/4.1. POLYGONUM MARITIMUM *10, Wight: Top of beach, Thorness Bay, SZ/46.94. S. A. Campbell, 1995, **RNG**, conf. J. R. Akeroyd. **11**, S. Hants.: Upper beach, Sandy Point, Hayling Island, SZ/75.98. R. P. Bowman, G. D. Field & P. D. Stanley, 1995, conf. J. R. Akeroyd (from photograph). 2nd record. *13, W. Sussex: With *P. aviculare* and *P. oxyspermum* on mixed sand and shingle, West Wittering, SU/773.977. P. D. Stanley, 1995, **herb. M. Briggs**, conf. J. R. Akeroyd.

†47/5.1 × 2. FALLOPIA JAPONICA × F. SACHALINENSIS (F. × BOHEMICA) *68, Cheviot: Bank of R. Tweed near Horncliffe, NT/928.496. R. J. Gornall, P. M. Hollingsworth & C. D. Preston, 1995, **LTR**, conf. J. Bailey. *87, W. Perth: Roadside near Inverarnan Bridge, NN/319.186. V. Gordon, 1993.

47/8.†5 × 14. RUMEX CONGLOMERATUS × R. FRUTESCENS (R. × WRIGHTII) *1, W. Cornwall: Sandy grassland, Phillack Towans, SW/568.392. D. T. Holyoak, 1994, **RNG**.

47/8.†5 × 19. RUMEX OBTUSIFOLIUS × R. FRUTESCENS *1, W. Cornwall: Sand quarry, Phillack Towans, SW/568.392. D. T. Holyoak, 1994, **RNG**, det. J. R. Akeroyd.

47/8.10 × 19. RUMEX HYDROLAPATHUM × R. OBTUSIFOLIUS (R. × LINGULATUS) *5, S. Somerset: Rhyne bank, North Newton North Moor, ST/323.310. I. P. Green, 1994, det. J. R. Akeroyd.

†47/8.11. RUMEX CRISTATUS *6, N. Somerset: Dunes, Sand Bay, Weston-super-Mare, ST/330.657. D. Maxwell, 1995, conf. I. P. Green.

47/8.†11 × 13. RUMEX CRISPUS × R. CRISTATUS (R. × DIMIDIATUS) *5, S. Somerset: Waste area, Minehead, SS/983.463. I. P. Green, 1994, det. J. R. Akeroyd.

47/8.†11 × 19. RUMEX CRISTATUS × R. OBTUSIFOLIUS (R. × LOUSLEYI) *5, S. Somerset: Waste area, Minehead, SS/983.463. I. P. Green, 1994, det. J. R. Akeroyd. *6, N. Somerset: Dunes, Sand Bay, Weston-super-Mare, ST/330.657. I. P. Green, 1995.

47/8.13b. RUMEX CRISPUS subsp. LITTOREUS 3, S. Devon: Shingle, Lannacombe, SX/800.307. Devonshire Association meeting, 1995, **herb. L. Spalton**, det. L. J. Margetts. 2nd record.

47/8.13 × 18. RUMEX CRISPUS × R. PULCHER (R. × PSEUDOPULCHER) *5, S. Somerset: Steep field, Bossington, SS/900.479. I. P. Green, 1995.

47/8.13 × 20. RUMEX CRISPUS × R. PALUSTRIS (R. × HETERANTHOS) *6, N. Somerset: Peat cutting, Sharpham, ST/471.396. I. P. Green, 1994, det. J. R. Akeroyd.

47/8.14 × 15. RUMEX CONGLOMERATUS × R. SANGUINEUS (R. × RUHMERI) *5, S. Somerset: Broad Hill, Hardington Mandeville, ST/494.118. I. P. Green, 1994. *6, N. Somerset: North-facing slope, Somerton, ST/480.304. I. P. Green, 1994, conf. J. R. Akeroyd.

47/8.14 × 19. RUMEX CONGLOMERATUS × R. OBTUSIFOLIUS (R. × ABORTIVUS) *58, Cheshire: Roadside, Adlington, SJ/91.80. J. H. Clarke, 1994, det. J. R. Akeroyd.

47/8.14 × 20. RUMEX CONGLOMERATUS × R. PALUSTRIS (R. × WIRTGENII) *6, N. Somerset: Peat cutting, Sharpham, ST/471.396. I. P. Green, 1994, det. J. R. Akeroyd.

47/8.14 × 21. RUMEX CONGLOMERATUS × R. MARITIMUS (R. × KNAFFII) *6, N. Somerset: Disused peat cutting, Meare, ST/449.403. P. R. Green, 1995, conf. J. R. Akeroyd.

47/8.15 × 19. RUMEX SANGUINEUS × R. OBTUSIFOLIUS (R. × DUFFTII) *1, W. Cornwall: Waste ground, Illogan, SW/683.435. G. A. Griffiths & D. T. Holyoak, 1993, det. D.T.H.

47/8.16 × 18. RUMEX PULCHER × R. RUPESTRIS (R. × TRIMENII) *1, W. Cornwall: By pool in dunes, Penhale Sands, SW/770.568. D. T. Holyoak, 1994, **RNG**, det. J. R. Akeroyd.

47/8.19 × 20. RUMEX OBTUSIFOLIUS × R. PALUSTRIS (R. × STEINII) *6, N. Somerset: Shapwick Heath Nature Reserve, ST/426.399. G. A. Griffiths & D. T. Holyoak, 1993, **herb. I. P. Green**, det. J. R. Akeroyd.

47/8.19 × 21. RUMEX MARITIMUS × R. OBTUSIFOLIUS (R. × CALLIANTHEMUS) *6, N. Somerset: Peat cutting, Sharpham, ST/456.387. I. P. Green & L. Wilkinson, 1994, det. J. R. Akeroyd.

†49/1.1. PAEONIA MASCULA *73, Kirkcudbrights.: Waste ground near Castle Douglas, NX/775.628. O. M. Stewart & A. White, 1995. 1st seen in 1991.

50/1.1. ELATINE HEXANDRA *45, Pembs.: Exposed mud by Rosebush Reservoir, SN/062.297. E. Hughes, 1995.

51/1.7a. HYPERICUM MACULATUM subsp. MACULATUM *77, Lanarks.: Grassland on golf course, Easter Moffat, NS/80.65. K. J. Watson, 1993, **GLAM**.

53/1.7. MALVA NEGLECTA **46**, Cards.: Sandy pasture by beach, Tan-y-bwlch, SN/580.799. A. O. Chater, 1995. 2nd extant locality.

53/2.1. LAVATERA ARBOREA †*61, S.E. Yorks.: Ditch bank by arable field, 3 km S.S.W. of Keyingham, TA/224.209. P. J. Cook, 1991, conf. N. K. B. Robson. Bank of R. Humber 4 km S. of Keyingham, TA/22.19. P. J. Cook, 1991. 1st and 2nd records.

†53/2.3. LAVATERA THURINGIACA *46, Cards.: Roadside verge, Capel Tygwydd, SN/279.431. A. O. Chater, 1994, **NMW**.

57/1.4 × 6. VIOLA CANINA × V. RIVINIANA (V. × INTERSITA) *1, W. Cornwall: Dune grassland, Penhale Sands, SW/771.575. C. N. French, D. T. Holyoak & T. C. G. Rich, 1995, **RNG**, conf. D. M. Moore.

57/1.4 × 7. VIOLA LACTEA × V. RIVINIANA *46, Cards.: Heathy coastal pasture, Mwnt, SN/196.521. A. O. Chater, 1992, **NMW**, det. D. M. Moore.

57/1.9b. VIOLA PALUSTRIS subsp. JURESSI **35**, Mons.: Marshy areas under trees, Cwm Merddog, SO/18.06. T. G. Evans, 1991. Wet area, Pen-y-fan Pond, SO/194.005. P. A. Smith, 1994. 1st and 2nd post-1930 records.

59/1.1. FRANKENIA LAEVIS †*1, W. Cornwall: Cliff, Prah Sands, SW/584.277. B. Hutchings, 1995.

61/1.3. POPULUS NIGRA subsp. BETULIFOLIA *67, S. Northumb.: By small stream, Humshaugh Burn, NY/917.717. F. Fewster, 1994, **herb. G. A. Swan**, det. E. Milne-Redhead. 1st native record and northernmost native site in Britain.

†61/1.4. POPULUS TRICHOCARPA *77, Lanarks.: Bing, Bardykes, NS/67.58. K. J. Watson, 1986, **GL**. Spreading by suckers along railway line, Burnside, NS/61.60. P. Macpherson, 1994, **herb. P.M.**, det. R. D. Meikle. 1st and 2nd records.

†61/2.6. SALIX DAPHNOIDES *42, Brecs.: Waste ground, Penderyn, SN/9.0. R. G. Woods, 1995.

61/2.9 × 10. SALIX CAPREA × S. VIMINALIS (S. × SERICANS) *58, Cheshire: Old sidings, Dukinfield, SJ/936.975. P. Jepson & G. M. Kay, 1993.

61/2.10b. SALIX CAPREA subsp. SPHACELATA *77, Lanarks.: Streamside, Glengavel Water, NS/6.3. P. Macpherson, 1995, **herb. P.M.**, det. R. D. Meikle. *80, Roxburghs.: *Salix* carr by Branxholme Wester Loch, NT/421.110. R. W. M. Corner, 1994, **herb. R.W.M.C.**, det. R. D. Meikle.

61/2.11 × 15. SALIX CINEREA × S. PHYLICIFOLIA (S. × LAURINA) *91, Kincardines.: Marsh, Crathes, NO/741.966. D. Donald, 1993, **herb. D. Welch**, conf. R. D. Meikle.

61/2.12. SALIX AURITA **29**, Cambs.: Edge of ride, Gamlingay Wood, TL/242.534. G. Crompton, V. Morgan & D. A. Wells, 1994, **CGE**, det. R. D. Meikle. Only extant locality.

61/2.12 × 15. SALIX AURITA × S. PHYLICIFOLIA (S. × LUDIFICANS) *80, Roxburghs.: *Carex paniculata* mire, Blackchester Moss, NT/558.272. R. W. M. Corner, 1995, **herb. R.W.M.C.**, det. R. D. Meikle.

61/2.17. SALIX LAPPONUM *99, Dunbarton: Rock face, S.W. slope of Ben Vane, NN/27.09. J. Taggart, 1995, conf. A. McG. Stirling (from photograph).

†62/2.1. DESCURAINIA SOPHIA **51**, Flints.: New earth bank near Burton Point, SJ/30.73. P. I. Morris, 1993. Path near sand dunes, Point of Ayr, SJ/120.849. J. Green, 1994. 1st and 2nd post-1930 records. **91**, Kincardines.: Field margin, Crathes, NO/763.966. D. Welch, 1995. 1st post-1930 record.

†62/7.1. Erysimum cheiranthoides **73**, Kirkcudbrights.: Rough grass at edge of golf course, Southerness, NX/975.544. O. M. Stewart, 1995. 2nd record.

†62/7.2. Erysimum cheiri **80**, Roxburghs.: Stone wall above sluice, R. Tweed, Hogarth's Mill, Kelso, NT/725.341. R. W. M. Corner, 1995. 1st post-1930 record.

62/12.2. Rorippa microphylla *__43__, Rads.: Wet depressions in seasonally flooded grassland, Rhosgoch Common National Nature Reserve, SO/19.48. Q. O. N. Kay, 1995.

62/12.5. Rorippa sylvestris **52**, Anglesey: Damp cultivated ground, Brynsiencyn, SH/49.67. G. Halliday, 1995. 2nd record. †**71**, Man: Stream banks, R. Neb, Raggatt, SC/244.827. L. S. Garrad, 1994, det. T. C. G. Rich. 2nd extant locality, and first extensive colonisation of a natural habitat.

†62/13.1. Armoracia rusticana **73**, Kirkcudbrights.: Waste ground, Castle Douglas, NX/799.610. O. M. Stewart, 1995. 2nd record.

†62/14.4. Cardamine raphanifolia *__5__, S. Somerset: Abundant on banks of Westford Stream, Sampford Arundel, ST/100.184. I. P. Green, 1994.

62/15.2. Arabis glabra **29**, Cambs.: Roadside bank, West Road, Gamlingay, TL/235.520. D. E. Coombe, 1995. Only extant locality.

†62/15.7. Arabis collina *__6__, N. Somerset: Plentiful on old walls, South Wood, Baltonsborough, ST/558.334. I. P. & P. R. Green, 1992, conf. T. C. G. Rich.

62/22.1. Erophila majuscula *__52__, Anglesey: Sandy roadside verge, Malltraeth, SH/40.68. R. H. Roberts, 1995, det. T. T. Elkington.

62/23.5. Cochlearia danica *__40__, Salop: A442 road between Cold Hatton and Crudgington, SJ/62.18. E. M. Stephenson, 1993. Side of dual carriageway, A41 road S. of Whitchurch, SJ/5.4. I. C. Trueman, 1993. 1st and 2nd records. **75**, Ayrs.: Roadside verge, A77 opposite Prestwick Airport, NS/36.23. A. Rutherford & A. McG. Stirling, 1995. 1st inland record.

†62/29.1. Iberis sempervirens *__58__, Cheshire: High wall of canal, Marple, SJ/961.895. A. J. Franks, 1990, conf. G. M. Kay. *__64__, Mid-W. Yorks.: Limestone scar, Ingleborough Hall estate, Clapham, SD/748.695. Yorkshire Naturalists' Union meeting, 1995.

†62/37.1b. Coincya monensis subsp. recurvata **58**, Cheshire: Old sidings, Dukinfield, SJ/936.975. G. M. Kay, E. & O. Kearns, 1993. 2nd record.

†62/38.1. Hirschfeldia incana *__51__, Flints.: Waste ground, Knowle Hill, Buckley, SJ/289.644. J. Phillips, 1994.

62/41.1. Crambe maritima *__51__, Flints.: Coastal dune, Prestatyn, SJ/074.842. R. Carter & P. Day, 1993.

62/42.1b. Raphanus raphanistrum subsp. maritimus **58**, Cheshire: One large plant on sand dunes, Hoylake, SJ/207.878. G. M. Kay, E. & O. Kearns & D. J. Tinston, 1993. Only extant locality for taxon which was thought to be extinct in the vice-county.

†65/8.1. Gaultheria procumbens *__5__, S. Somerset: Heathland, Skilgate, Haddon Hill, SS/966.287. I. P. Green, 1994, det. N. K. B. Robson.

†65/8.3. Gaultheria mucronata **5**, S. Somerset: Under conifers, Porlock Wood, ST/869.478. J. Maxwell, 1993. 2nd record.

65/13.1. Vaccinium oxycoccos **3**, S. Devon: In small quantity in moorland, North Bovey, SX/715.834. C. Cornish, 1994. 1st post-1930 record.

65/13.5. Vaccinium uliginosum †*__5__, S. Somerset: Heathland, Skilgate, Haddon Hill, SS/955.288. I. P. Green, 1994, det. R. D. Meikle & N. K. B. Robson.

69/4.2. Lysimachia nummularia *__91__, Kincardines.: Damp, semi-natural woodland, Durris, NO/773.966. D. Welch, 1995, **herb. D.W.**

†69/4.5. Lysimachia punctata *50, Denbs.: Roadside verge, Llanrwst, SH/795.623. G. H. Battershall, 1995.

69/5.1. Trientalis europaea 75, Ayrs.: Mochrum Hill, Maybole, NS/265.102. J. Blane, 1995. 1st post-1930 record, confirming 19th century records from this site.

†72/1.1. Escallonia macrantha 71, Man: Top of sea cliff, Lag Birragh, SC/418.777. L. S. Garrad, 1995. 2nd record.

72/2.6. Ribes alpinum †*5, S. Somerset: Hedgerow, Coker Marsh, ST/543.119. C. Cornell, 1994.

73/1.1. Crassula tillaea †*1, W. Cornwall: Thin, gravelly soil of car park, Holywell, SW/767.586. D. T. Holyoak, 1995, conf. R. J. Murphy.

†73/1.3. Crassula helmsii *50, Denbs.: Pond, Chirk Castle, SJ/271.380. J. A. Green, 1995. Lake, Fenns Wood, SJ/505.386. K. J. Watson, 1995. 1st and 2nd records. *87, W. Perth: Exposed mud, Mill Dam, Kippen Muir, NS/613.919. J. Mitchell, 1995.

†73/5.4. Sedum spectabile *58, Cheshire: Bank of old railway, Bredbury, Stockport, SJ/926.918. E. Kearns, 1993.

74/5.4. Saxifraga stellaris *83, Midlothian: Upland flush, The Kipps S. of Gladhouse Reservoir, NT/298.499. C. Dixon, 1993, conf. D. McKean.

74/9.1. Chrysosplenium oppositifolium 29, Cambs.: Ancient woodland, Ditton Park Wood, TL/672.568. S. Leatherdale, 1995, **CGE**. 2nd record.

†75/8.2. Rubus tricolor *17, Surrey: Extensive colony on side of roadside ditch, Hascombe, TQ/000.382. E. Norman & K. W. Page, 1994. Roadside verge, Ripley, TQ/037.546. J. F. Leslie, J. M. Montgomery & K. W. Page, 1995. 1st and 2nd records.

†75/8.6. Rubus parviflorus *99, Dunbarton: Semi-natural woodland, Robert Ness, Rosneath, NS/273.818. A. Rutherford & A. McG. Stirling, 1995.

†75/8.9. Rubus spectabilis *46, Cards.: Forming thickets in woodland, dingle E. of Gwernant Home Farm, Troed-yr-aur, SN/337.460. A. O. Chater, 1995, **NMW**. *53, S. Lincs.: Bramble Hills near Skegness, TF/56.59. M. S. Campbell, 1937, det. D. E. Allen. *66, Co. Durham: Site of old tannery, Eaglescliffe, NZ/4.1. S. J. Bungard, 1990, **BM**. *86, Stirlings.: Thicket near Endrick Water N. of Killearn, NS/5.8. No collector, 1972, **BM**, conf. D. E. Allen. *92, S. Aberdeen: Wood, Bridge of Don, NJ/9.0. S. Adam, 1930, **BM**. *94, Banffs.: Woods, Duff House, Banff, NJ/69.63. E. V. Herbert, 1953, **BM**, det. D. E. Allen.

†75/8.11. Rubus cockburnianus *17, Surrey: Well established on roadside verge, Ripley, TQ/037.546. J. M. Montgomery, 1995, det. K. W. Page.

75/8.30. Rubus sulcatus *28, W. Norfolk: Barney Wood, TF/986.327. A. L. Bull, 1995.

75/8.34 Rubus albionis *59, S. Lancs.: Bank of R. Medlock, Park Bridge, Oldham, SD/943.024. D. P. Earl, 1993, **BON**, det. A. Newton.

75/8.46. Rubus cumbrensis *59, S. Lancs.: Hedgerow E. of Belmont Mill, SD/683.158. D. P. Earl, 1994, **BON**, det. A. Newton.

75/8.65. Rubus monensis *50, Denbs.: Hedge, Pentrefoelas, SH/86.52. G. H. Battershall, 1995, det. A. Newton.

75/8.68. Rubus perdigitatus *9, Dorset: Roadside, Wootton Hill, SY/35.97. L. J. Margetts, 1995, det. A. Newton.

75/8.78. Rubus riparius *3, S. Devon: Forestry ride, Trinity Hill, Axminster, SY/30.95. L. J. Margetts, 1986, **herb. A. Newton**, det. A.N. *9, Dorset: Moorland, Lambert's Castle, SY/36.98. L. J. Margetts, 1991, **herb. A. Newton**, det. A.N. *11, S. Hants.: Heathy scrub, Chark Common golf links, SU/57.02. D. E. Allen, 1990, **BM**, conf. A. Newton.

75/8.101. RUBUS DUMNONIENSIS *__50__, Denbs.: Hedge, Pentrefoelas, SH/82.57. G. H. Battershall, 1995, det. A. Newton.

†75/8.102. RUBUS ELEGANTISPINOSUS *__10__, Wight: Clay spinney, Nettlestone, SZ/623.904. D. E. Allen, 1995, **BM**, conf. A. Newton. *__59__, S. Lancs.: Old railway line, Horwich, Bolton, SD/633.109. J. Buckley-Earl & D. P. Earl, 1993, **BON**, det. A. Newton.

75/8.117. RUBUS POLYANTHEMUS *__H7__, S. Tipperary: Ballydavid Wood, Glen of Aherlow, R/97.28. R. FitzGerald, 1993, det. D. E. Allen. *__H15__, S.E. Galway: By Owendalulleegh River, R/5.9. J. Roffey, 1911, **BM**, det. D. E. Allen.

75/8.118. RUBUS PROLONGATUS *__H1__, S. Kerry: Roadside, Killarney National Park, V/906.805. M. Dowlen, 1994, **BM**, det. D. E. Allen.

75/8.134. RUBUS ARMENIACUS *__50__, Denbs.: Waste ground, Llanrwst, SH/795.623. G. H. Battershall, 1995, det. A. Newton. *__51__, Flints.: Waste ground, Walwen, Bagillt, SJ/205.766. D. P. Earl, 1995.

75/8.143. RUBUS WINTERI *__5__, S. Somerset: Quarry, West Monkton, ST/26.28. E. S. Marshall, undated specimen, **BM**, det. D. E. Allen.

75/8.144. RUBUS ADSCITUS *__14__, E. Sussex: Uckfield, TQ/4.2. E. H. Farr, undated specimen, **BM**, det. D. E. Allen. *__28__, W. Norfolk: Ancient woodland, Barney Wood, TF/986.327. A. L. Bull, 1995.

75/8.154. RUBUS LANATICAULIS *__46__, Cards.: Lane through open woodland, Rhosgellan-fawr, Wallog, SN/596.854. A. O. Chater & D. E. Allen, 1994, **BM**, det. A. Newton.

75/8.159. RUBUS ORDOVICUM *__46__, Cards.: Margin of deciduous wood, Coed Wileirog, Llangorwen, SN/603.856. A. O. Chater & D. E. Allen, 1994, **BM**, conf. A. Newton. *__52__, Anglesey: Heath, Llaniestyn Common, SH/58.79. G. H. Battershall & A. Newton, 1995, det. A.N.

75/8.171. RUBUS MUCRONATIFORMIS *__3__, S. Devon: Hedge, Broad Down, Churchingford, ST/24.12. L. J. Margetts, 1990, **herb. L.J.M.**, det. A. Newton.

75/8.176. RUBUS AEQUALIDENS [__9__, Dorset: delete record published in *Watsonia* **20**: 425 (1995); specimen in **BM** is *R. cinerosiformis*, det. A. Newton.]

75/8.190. RUBUS LEIGHTONII *__59__, S. Lancs.: Scrub, Leeds & Liverpool Canal, Bryn, SD/583.028. D. P. Earl, 1992, **BON**, det. A. Newton.

75/8.193. RUBUS MELANODERMIS *__1__, W. Cornwall: Path through scrub, Connor Downs, SW/60.40. L. J. Margetts, 1977, **NMW**, det. D. E. Allen. *__2__, E. Cornwall: Edge of scrub, Turnaware Point, SW/83.88. L. J. Margetts, 1976, **NMW**, det. D. E. Allen.

75/8.195. RUBUS MOYLEI *__59__, S. Lancs.: Scrub, Ellesmere Park, Eccles, SJ/775.995. D. P. Earl, 1991, **BON**, det. A. Newton.

75/8.206. RUBUS ANISACANTHOS *__28__, W. Norfolk: Ancient woodland, Barney Wood, TF/986.327. A. L. Bull, 1995.

75/8.214. RUBUS FORMIDABILIS *__10__, Wight: Abundant throughout Youngwoods Copse, Alverstone, SZ/57.85. D. E. Allen, 1995, **BM**, conf. A. Newton. *__14__, E. Sussex: Woodland ride, Abbotts Wood, TQ/558.072. R. J. Pankhurst & P. J. Stafford, 1985, **BM**, det. D. E. Allen, conf. A. Newton.

75/8.221. RUBUS PASCUORUM *__46__, Cards.: Bank between road and river, Glanyrafon Industrial Estate, Llanbadarn Fawr, SN/613.804. D. E. Allen & A. O. Chater, 1994, **BM**, conf. A. Newton.

75/8.222. RUBUS ADENANTHOIDES *__59__, S. Lancs.: Wooded streamside, Lower Cophurst, SD/592.214. D. P. Earl, 1994, **BON**, det. A. Newton.

75/8.227. RUBUS CANTIANUS *__14__, E. Sussex: Newbridge, Colemans Hatch, TQ/45.32. W. C. Barton, 1932, **BM**, det. D. E. Allen.

75/8.245. RUBUS PALLIDUS *__58__, Cheshire: Woodland, Lyme Park, Disley, SJ/964.836. J. Buckley-Earl & D. P. Earl, 1993, **BON**, det. A. Newton. *__59__, S. Lancs.: Woodland path, Jumbles Reservoir, SD/736.148. D. P. Earl, 1993, **BON**, det. A. Newton.

75/8.272. RUBUS INFESTIOR *__3__, S. Devon: Open area, Harpford Wood, SY/099.906. B.S.B.I. meeting, 1995, det. A. Newton. Extension of range 160 km westwards. *__59__, S. Lancs.: Bank above ditch E. of Jackson's Boat, SJ/813.926. D. P. Earl, 1993, **BON**, det. A. Newton.

75/8.278. RUBUS NEWBRIDGENSIS *__11__, S. Hants.: Margins of fragment of ancient wood, Betty Mundy's Bottom, SU/580.225. D. E. Allen, 1983, **herb. D.E.A.**, conf. A. Newton.

75/8.293. RUBUS VIGURSII *__9__, Dorset: hillside scrub, Pilsdon Pen, ST/41.01. A. L. Bull & A. Newton, 1995, **herb. A. Newton**, det. A.N.

75/8.299. RUBUS PEDEMONTANUS *__50__, Denbs.: Hedge, Pentrefoelas, SH/86.52. G. H. Battershall, 1995, det. A. Newton.

75/8.317. RUBUS TENUIARMATUS *__42__, Brecs.: Rough grassland and hedge, Ffawyddog near Llangattock, SO/201.182. M. Porter, 1995.

75/8.320. RUBUS WARRENII *__12__, N. Hants.: Hedge of bridleway, Bramley Frith Wood, SU/645.599. D. E. Allen, 1995, **BM**, conf. A. Newton.

75/8.ari. RUBUS ARICONIENSIS *__3__, S. Devon: Hedgebank near Madford, ST/153.109. M. Porter, 1995, **herb. M.P.**

75/8.seg. RUBUS SEGONTII *__50__, Denbs.: Hedge, Tal-y-cafn, SH/78.68. G. H. Battershall, 1995, det. A. Newton. *__52__, Anglesey: Heath, Llandegfan Common, SH/57.75. G. H. Battershall & A. Newton, 1995, det. A.N.

75/9.14 × 15. POTENTILLA ANGLICA × P. REPTANS (P. × MIXTA) *__50__, Denbs.: Lowland meadow, Bangor-is-y-coed, SJ/498.435. J. Phillips, 1994, det. B. Harold.

75/15.2. AGRIMONIA PROCERA **50**, Denbs.: Lane edge, Eglwysbach, SH/814.670. W. McCarthy, 1995. 2nd post-1930 record.

†75/18.1. ACAENA NOVAE-ZELANDIAE **67**, S. Northumb.: Trackside, Simonside forest car park, NZ/037.996. D. & T. Hardy, 1995, **herb. G. A. Swan**. 2nd record.

†75/19.2. ALCHEMILLA CONJUNCTA *__73__, Kirkcudbrights.: Roadside verge E. of Castle Douglas, NX/775.628. O. M. Stewart & A. White, 1995.

75/19.7. ALCHEMILLA ACUTILOBA †*__77__, Lanarks.: Trackside near Cadder, NS/63.71. J. H. Dickson & R. Hunter, 1992, **GL**, det. S. M. Walters. Still present in 1995.

75/19.12. ALCHEMILLA GLOMERULANS **108**, W. Sutherland: Amongst gneiss boulders by outflow of Loch a'Choire Dheirg, Glas Bheinn, NC/254.247. G. P. Rothero, 1995, det. S. M. Walters. 2nd record.

†75/19.15. ALCHEMILLA MOLLIS *__51__, Flints.: Grassy roadside verge, Burntwood Pentre, Buckley, SJ/292.648. J. Phillips, 1994.

75/21.4 × 11. ROSA ARVENSIS × R. STYLOSA (R. × PSEUDORUSTICANA) *__14__, E. Sussex: Hedge by steam S.W. of Mudbrooks House, Forest Row, TQ/402.337. P. White, 1995, **herb. P. A. Harmes**, det. A. L. Primavesi.

75/21.4 × 12. ROSA ARVENSIS × R. CANINA (R. × VERTICILLACANTHA) *__11__, S. Hants.: Hedge, Moorgreen Farm, West End, Southampton, SU/482.153. P. D. Stanley, 1995, **herb. A. L. Primavesi**, det. A.L.P. *__40__, Salop: Woodland near Llynclys, SJ/266.233. J. H. Clarke, 1994, det. A. L. Primavesi.

†75/21.7. ROSA 'HOLLANDICA' *__5__, S. Somerset: Hedge, White Ball, ST/099.189. A. C. Leslie, 1994.

75/21.11. Rosa stylosa *46, Cards.: Roadside hedgebank, Pont Gilfach, Gilfach-yr-halen, SN/437.613. A. O. Chater & J. P. Woodman, 1994, **NMW**, conf. G. G. Graham.

75/21.11 × 14. Rosa obtusifolia × R. stylosa *17, Surrey: Wisley, TQ/060.583. A. C. Leslie, 1995, det. A. L. Primavesi.

75/21.12. Rosa canina *108, W. Sutherland: Open birchwood by road below Creag Merkan, NC/465.538. P. A. Evans, 1995, det. A. L. Primavesi as Group *Transitoriae*. 2nd record.

72/21.12 × 13b. Rosa caesia subsp. glauca × R. canina *17, Surrey: Grassland near Caterham Barracks, TL/315.564. G. Fookes, 1995, det. A. L. Primavesi. *108, W. Sutherland: Light scrub by road, Kempie, NC/447.580. P. A. Evans, 1995, det. A. L. Primavesi.

75/21.12 × 14. Rosa canina × R. obtusifolia (R. × dumetorum) *14, E. Sussex: Hedge, Quabrook, TQ/444.343. T. C. G. Rich, 1995, **herb. P. A. Harmes**, det. A. L. Primavesi.

75/21.12 × 15. Rosa canina × R. tomentosa (R. × scabriuscula) *17, Surrey: Trackside, Puttenham, SU/913.481. A. C. Leslie, 1995, det. A. L. Primavesi.

75/21.13 × 16. Rosa caesia × R. sherardii *108, W. Sutherland: Roadside scrub, Ribigill, NC/579.543. P. A. Evans, 1995, det. A. L. Primavesi.

75/21.17 × 18. Rosa mollis × R. rubiginosa (R. × molliformis) *108, W. Sutherland: Roadside along Kyle of Tongue, NC/553.541. P. A. Evans, 1995, det. A. L. Primavesi.

75/21.18. Rosa rubiginosa *46, Cards.: Overgrown hedge, W. bank of Afon Mwldan, Cardigan, SN/176.461. A. O. Chater, 1995, **NMW**, conf. G. G. Graham. 1st record of a native population.

†75/22.13. Prunus lusitanica *49, Caerns.: Delete record published in *Watsonia* **20**: 292 (1995) and replace by: Steeply sloping copse between Tyn-y-Groes and Talycafn Bridge, SH/785.719. R. Lewis, 1993, **NMW**. Spreading from bird-sown plants.

†75/23.1. Oemleria cerasiformis *14, E. Sussex: Hazel coppice, Hollybush Wood, Standen, TQ/389.354. R. M. Burton, 1995.

75/28.20. Sorbus devoniensis *5, S. Somerset: Hedgerow and small wood, Bury, SS/950.271. I. P. Green, 1994, det. P. J. M. Nethercott.

†75/30.1. Amelanchier lamarckii *46, Cards.: *Quercus petraea* wood on rocky ridge S. of Eglwys Fach church, SN/685.953. A. O. Chater, 1994, **NMW**. Heathy carr, Covert Coch and West Marsh, Ynys-hir R.S.P.B. Reserve, SN/676.955. A. O. Chater & W. M. Condry, 1995. 1st and 2nd records, both of self-sown trees.

†75/32.6. Cotoneaster obtusus *17, Surrey: Towpath, Isleworth, TQ/168.753. E. Norman, 1994.

†75/32.9. Cotoneaster frigidus *77, Lanarks.: Edge of shrubby wood, Shieldhall, NS/53.65. P. Macpherson, 1989, **herb. P.M.**, det. J. Fryer. Still present in 1995.

†75/32.9 × 10. Cotoneaster frigidus × C. salicifolius (C. × watereri) *1, W. Cornwall: Edge of dunes, Phillack Towans, SW/56.38. D. T. Holyoak, 1993. *46, Cards.: Slope above shore, East Bay, Aber-porth, SN/258.514. A. O. Chater, 1992, **NMW**, conf. J. Fryer.

†75/32.10. Cotoneaster salicifolius *46, Cards.: Rocks by Afon Castell, Ponterwyd, SN/749.808. A. O. Chater, 1991, **NMW**, det. J. Fryer.

†75/32.13. Cotoneaster lacteus *41, Glam.: Cliff-top, West Cliff, Pennard, SS/552.873. Q. O. N. Kay, 1994, **NMW**, det. J. Fryer & G. Hutchinson. Rhoose Quarry, ST/063.659. G. Hutchinson, 1994, **NMW**. 1st and 2nd vice-county and Welsh records. *77, Lanarks.: Abandoned railway station adjacent to Botanic Gardens, Glasgow, NS/56.67. P. Macpherson, 1995, **herb. P.M.**, det. J. R. Palmer.

†75/32.22. Cotoneaster hjelmqvistii *46, Cards.: Wooded cliff, Glandyfi, SN/694.968. A. O. Chater, 1993, **NMW**, conf. J. Fryer.

†75/32.26. COTONEASTER DIVARICATUS *83, Midlothian: Wall top, E. of Loanhead, NT/298.658. D. R. McKean, 1993, **E**, det. J. Fryer.

†75/32.35. COTONEASTER REHDERI *1, W. Cornwall: Edge of dunes, Upton Towans, SW/57.39. D. T. Holyoak, 1993. *46, Cards.: Gorse scrub near Aberystwyth Golf Course, SN/587.824. S. P. Chambers & A. O. Chater, 1994, conf. J. Fryer. 2nd record. *77, Lanarks.: Edge of wood, Eastfield, NS/62.61. P. Macpherson, 1995, **herb. P.M.**, det. B. Hylmö.

†75/32.37. COTONEASTER DIELSIANUS *73, Kirkcudbrights.: Embankment of old railway line, Summerhill, Dumfries, NX/95.76. O. M. Stewart, 1994, det. J. Fryer.

†75/32.39. COTONEASTER FRANCHETII *46, Cards.: Scrub on railway embankment W. of bridge over Afon Einion, Glandyfi, SN/686.966. A. O. Chater, 1992, **NMW**, conf. J. Fryer. 1st confirmed Welsh record.

†75/32.40. COTONEASTER STERNIANUS 41, Glam.: Rhoose Quarry, ST/057.660. G. Hutchinson, 1994, **NMW**. 2nd record. *51, Flints.: Disused limestone quarry, Tremeirchion, SJ/081.732. J. Phillips, 1994, det. G. Hutchinson. *58, Cheshire: Old wall, Stockport, SJ/898.905. G. M. Kay, 1993, det. J. R. Palmer. *73, Kirkcudbrights.: Wall below Tongland church, NX/69.53. O. M. Stewart, 1994, det. J. Fryer.

†75/33.2. PYRACANTHA ROGERSIANA *17, Surrey: Bird-sown bushes in old cemetery, Barnes, TQ/228.764. E. Norman, 1994.

†75/35.5. CRATAEGUS PERSIMILIS *12, N. Hants.: Old hedgerow in lane leading to Bramley Frith Wood, SU/646.597. D. E. Allen, 1994, **herb. A. Brewis**, det. E. J. Clement. Roadside hedge between Alton and Selborne, SU/721.376. A. Brewis, 1994, **herb. A. Brewis**. 1st and 2nd records.

75/35.8. CRATAEGUS LAEVIGATA *51, Flints.: Hedge, Tremeirchion, SJ/074.717. J. A. Green, 1993. 1st post-1930 record.

†77/3.1 × ori. COLUTEA ARBORESCENS × C. ORIENTALIS (C. × MEDIA) *6, N. Somerset: Stonework of bridge, Croscombe, ST/585.444. P. R. Green, 1995.

†77/7.7. LATHYRUS GRANDIFLORUS *40, Salop: Edge of waste land, Oakengates, Telford, SJ/699.104. R. M. Stokes, 1994.

77/14.4. VICIA SYLVATICA *11, S. Hants.: Clearing in beech/spruce plantation, Bottom Copse, Corhampton, SU/58.20. P. A. Budd, 1995, det. R. P. Bowman. Only extant locality. 79, Selkirks.: Riverside banks, Tima Water N. of Gair, NT/282.105. R. W. M. Corner, 1995, **herb. R.W.M.C.** Only extant locality.

†77/14.11c. VICIA SATIVA subsp. SATIVA *50, Denbs.: Shaded roadside verge, Llansannan, SH/931.659. J. A. Green, 1995, **NMW**.

†77/15.9. LATHYRUS LATIFOLIUS *46, Cards.: Dry, grassy bank, Felin-y-mor Road, Aberystwyth, SN/580.806. S. P. Chambers, 1995.

†77/18.2c. MEDICAGO SATIVA subsp. SATIVA *73, Kirkcudbrights.: Waste ground, Castle Douglas, NX/75.62. O. M. Stewart & A. White, 1995. 2nd post-1930 record.

77/19.1. TRIFOLIUM ORNITHOPODIOIDES 51, Flints.: Point of Ayr, SJ/1.8. D. Green, 1993. 1st post-1930 record.

77/19.6. TRIFOLIUM SUFFOCATUM *71, Man: Short grass on sandy ground near sea, Premier Road, Ramsey, SC/4.9. M. Devereau & B. A. Tregale, 1993.

†77/25.5a. GENISTA HISPANICA subsp. OCCIDENTALIS *40, Salop: Stony waste ground, Oakengates, Telford, SJ/699.104. R. M. Stokes, 1994.

77/26.1 × 2. ULEX EUROPAEUS × U. GALLII *4, N. Devon: Moorland, Woodland Common, SS/855.286. L. J. Margetts & L. M. Spalton, 1995, **herb. L.J.M.**

†79/2.2. MYRIOPHYLLUM AQUATICUM 29, Cambs.: Pond in nature reserve, Bar Hill, TL/377.630. H. Belcher & E. Swale, 1994. 2nd record. 40, Salop: Newly dredged part of Old

Shrewsbury Canal, SJ/511.146. S. J. Whild, 1994. 2nd record. **46**, Cards.: In old flood debris in dry hollow by stream in wooded gorge, Afon Hirwaun, Ponthirwaun, SN/263.451. A. O. Chater, 1994. 2nd record. *__59__, S. Lancs.: With *Spirodela polyrhiza* in old marl pit N. of Halewood, SJ/436.897. V. Gordon, 1995.

84/1.1 × †8. EPILOBIUM CILIATUM × E. HIRSUTUM (E. × NOVAE-CIVITATIS) *__58__, Cheshire: Waste land, Dukinfield SJ/938.973. A. R. Franks, 1993, **herb. G. M. Kay**, det. G. Kitchener.

84/1.2 × 9. EPILOBIUM PALUSTRE × E. PARVIFLORUM (E. × RIVULARE) *__46__, Cards.: Abundant in *Molinia caerulea* tussock marsh, Rhos Gellie N.E. of Plwmp, SN/379.536. A. O. Chater & D. P. Stevens, 1994, **NMW**, conf. T. D. Pennington.

84/1.3 × 6. EPILOBIUM MONTANUM × E. OBSCURUM (E. × AGGREGATUM) *__1__, W. Cornwall: Disturbed, stony ground near Mount Hawke, SW/703.470. D. T. Holyoak, 1993.

84/1.3 × †8. EPILOBIUM CILIATUM × E. MONTANUM *__40__, Salop: Pant coalyard on disused Llanymynech railway, SJ/276.220. J. H. Clarke, 1994, det. G. Kitchener. *__110__, Outer Hebrides: Garden, Sidinish, North Uist, NF/87.63. J. W. Clark, 1993, **E**, det. D. R. McKean.

†84/1.8. EPILOBIUM CILIATUM *__97__, Westerness: Waste ground by shore, Caol, NN/109.759. J. W. Clark, 1995, **E**, det. R. J. Pankhurst.

†84/1.12. EPILOBIUM BRUNNESCENS *__6__, N. Somerset: Forest track, Rowberrow Warren, ST/463.583. I. P. Green, 1995.

84/3.1. LUDWIGIA PALUSTRIS †*__17__, Surrey: Pond margin, Putney Heath, TQ/237.733. U. Sutcliffe, 1995, conf. K. Page & E. Norman.

†84/4.1. OENOTHERA GLAZIOVIANA *__77__, Lanarks.: Abandoned industrial estate S. of Eastfield, Glasgow, NS/63.61. P. Macpherson, 1995.

†84/4.1 × 3. OENOTHERA BIENNIS × O. GLAZIOVIANA *__40__, Salop: Alongside A442 road, Quatford, SO/73.90. J. C. Bowra, 1995. *__77__, Lanarks.: Abandoned industrial estate S. of Eastfield, Glasgow, NS/63.61. P. Macpherson, 1995, **herb. P.M.**, det. J. C. Bowra.

†84/4.4. OENOTHERA CAMBRICA **38**, Warks.: Quarry, Nuneaton, SP/35.89. A. Hackett, 1963, **WAR**, det. J. C. Bowra. 2nd vice-county record, and earliest record from vice-county. **50**, Denbs.: Old railway, Fenns Moss, SJ/478.367. K. J. Watson, 1995. 2nd record.

89/1.1 × †per. ILEX AQUIFOLIUM × I. PERADO (I. × ALTACLERENSIS) *__77__, Lanarks.: River bank, Kelvinside, NS/56.67. P. Macpherson, A. McG. Stirling & K. J. Watson, 1994, **herb. P.M.**, det. A. O. Chater.

92/1.1. RHAMNUS CATHARTICA †*__77__, Lanarks.: Wood, Harthill, NS/90.64. P. Macpherson, 1995, **herb. P.M.**, det. A. McG. Stirling.

†93/2.1. PARTHENOCISSUS QUINQUEFOLIA **46**, Cards.: Roadside hedge, B4353 road S. of Llandre station, SN/626.865. A. O. Chater, 1995. 2nd record.

94/2.1. RADIOLA LINOIDES *__83__, Midlothian: Sandy ground, Hagbrae, NT/378.621. C. Dixon, 1995, det. D. R. McKean.

†99/1.4. OXALIS EXILIS *__40__, Salop: Well naturalised at edge of churchyard and on wall, Fish Street, Shrewsbury, SJ/493.124. R. M. Stokes, 1994.

†102/1.8. OXALIS ARTICULATA *__46__, Cards.: Roadside hedgebank E. of Rhydypennau school, Llandre, SN/629.862. A. O. Chater, 1995, **NMW**.

†102/1.10. OXALIS DEBILIS *__46__, Cards.: Roadside hedgebank S. of A482 road bridge, Aberaeron, SN/458.623. A. O. Chater, 1994, **NMW.**

†102/1.11. OXALIS LATIFOLIA *__4__, N. Devon: Steep, grassy slope, Bampton Castle, SS/958.225. L. J. Margetts, 1990, **herb. L.J.M.**

†102/1.14. Oxalis incarnata *77, Lanarks.: Garden weed, Cambuslang, NS/63.60. E. K. Lindsay & P. Macpherson, 1995, **herb. P.M.**, det. M. F. Watson.

†103/1.1. Geranium endressii *46, Cards.: Spreading from dumped garden rubbish into woodland, Cwm Woods, Aberystwyth, SN/602.832. S. P. Chambers, 1993.

†103/1.17. Geranium macrorrhizum *50, Denbs.: Edge of wood, Colwyn Bay, SH/832.801. G. Battershall, 1995. 1st Welsh record.

105/1.1. Impatiens noli-tangere †58, Cheshire: Wood, Comber Mere, SJ/592.449. A. Blacklay & S. Burton, 1995. 1st record this century.

†105/1.2. Impatiens capensis *50, Denbs.: Canal bank, Bettisfield, SJ/465.356. B.S.B.I. meeting, 1995, **NMW**.

107/6.2. Anthriscus caucalis 58, Cheshire: Sandy field, Tilstone Bank, SJ/565.595. J. Davidson, 1993. 2nd extant locality.

107/7.1. Scandix pecten-veneris 61, S.E. Yorks.: Wheat field S. of Skirlaugh, TA/143.377. F. Kenington, 1995. Wheat field S. of Burton Pidsea, TA/252.308. R. Middleton, 1995. Only extant localities.

107/17.1. Crithmum maritimum *58, Cheshire: Rocks by shore, Hoylake, SJ/203.884. P. Gateley & K. Watson, 1994, conf. G. M. Kay. Shore, Caldy, SJ/222.849. G. K. Watson, 1995. 1st and 2nd records.

107/22.1. Silaum silaus 47, Monts.: Unimproved fields, Churchstoke, SO/2.9. T. Teearu, 1995, det. I. C. Trueman. 2nd record.

†107/38.1. Levisticum officinale *83, Midlothian: Rough grassland near Holyrood Palace. Edinburgh, NT/26.73. A. White, 1994, det. D. R. McKean.

†107/39.3. Peucedanum ostruthium 83, Midlothian: Verge, Ludgate near Stow, NT/449.429. D. Adamson & G. McDougall, 1994. 1st record since 1894.

†110/2.1. Lycium barbarum 91, Kincardines.: Shore, Johnshaven, NO/798.670. D. Welch, 1995, **ABD**. 1st post-1930 record.

110/8.1a. Solanum nigrum subsp. nigrum †*73, Kirkcudbrights.: Abundant at edge of field of maize near East Logan, NX/81.63. O. M. Stewart, 1995. 1st record of established population.

†110/8.1b. Solanum nigrum subsp. schultesii *29, Cambs.: Set-aside field, Hall Close, Fen Road, Bassingbourn, TL/326.449. P. D. Sell, 1995, **CGE**. *40, Salop: Base-enriched area near roadside verge, Shrewsbury, SJ/482.140. R. M. Stokes, 1994. *46, Cards.: Roadside verge and garden weed, Glyn-Rheidol farm, Cwm Rheidol, SN/712.787. A. O. Chater, 1995, **NMW**.

†110/8.8. Solanum laciniatum *5, S. Somerset: Field edge and hedge bank, Porlock Weir, SS/866.475. D. Maxwell, 1995.

112/1.3. Cuscuta epithymum 46, Cards.: Abundant on *Lotus corniculatus* in tussocky pasture W. of Cwm Rheidol leadmine, SS/727.782. T. Doidge, 1995. 2nd extant locality.

113/2.1. Nymphoides peltata †99, Dunbarton: Shallow water in sheltered bay, Camstradden Bay, Loch Lomond, NS/36.92. J. Mitchell, 1995, **GLAM**, det. A. McG. Stirling. 2nd record.

†116/3.3. Pulmonaria rubra 73, Kirkcudbrights.: Roadside verge and ditch E. of Glenlochar, NX/71.64. O. M. Stewart & A. White, 1995. 2nd record and only extant locality.

116/4.1 × †2. Symphytum asperum × S. officinale (S. × uplandicum) *108, W. Sutherland: Tipped soil near Tongue House, NC/590.586. M. E. Braithwaite, 1995.

†116/4.4. Symphytum grandiflorum *58, Cheshire: Roadside verge, Saighton, SJ/443.621. J. E. Hawksford, 1994.

†116/4.2 × 7. Symphytum asperum × S. caucasicum *83, Midlothian: Rough grass verge, Liberton Dams, Edinburgh, NT/27.70. R. Learmouth, 1994, **E**, det. T. W. J. Gadella & F. H. Perring.

116/11.1. Mertensia maritima **71**, Man: Traie Vane, Port Erin, SC/195.695. J. Lamb, 1995. Only extant locality.

116/17.1. Cynoglossum officinale **83**, Midlothian: Grassland, Polton, NT/287.647. C. Dixon, 1995. 1st post-1930 record.

†118/3.1. Leonurus cardiaca **29**, Cambs.: Haddenham Burial Ground Nature Reserve, TL/462.756. A. Arbon, 1994, **CGE**, det. J. O. Mountford.

†118/4.1c. Lamiastrum galeobdolon subsp. argentatum *75, Ayrs.: Rough wood border near Fullarton House, Troon, NS/339.301. A. Rutherford & A. McG. Stirling, 1987. Steep wooded bank by A714 road, Letterpin, NX/201.911. A. Rutherford & A. McG. Stirling, 1995. 1st and 2nd records. *78, Peebless.: Abundantly naturalised by R. Lyne, West Linton, NT/14.52. D. J. McCosh, 1995.

118/5.4. Lamium hybridum **67**, S. Northumb.: Old walled vegetable garden, Haughton Castle, NY/918.728. M. E. Braithwaite, 1995. Only extant locality.

†118/7.2. Phlomis fruticosa *5, S. Somerset: Corner of field, Selworthy, SS/909.467. C. Giddens, 1995.

118/23.1 × †3. Mentha arvensis × M. spicata (M. × gracilis) *40, Salop: Banks of R. Severn, Underdale, Shrewsbury, SJ/505.138. R. M. Stokes, 1995. *58, Cheshire: Bank of tributary of R. Dee, Farndon, SJ/414.539. G. M. Kay, 1989, **herb. G.M.K.**, det. R. M. Harley. 1st localised record.

118/23.5. Mentha pulegium †58, Cheshire: Grass sward by sea wall, Eastham Ferry, SJ/365.817. K. Watson, 1995, conf. G. M. Kay. Re-seeded areas of reclamation site, Anderton, SJ/654.751. G. M. Kay, 1995, **herb. G.M.K.** 1st records this century, both believed to have been sown with grass seed. †59, S. Lancs.: Shrub bed, Penwortham, SD/525.278. R. Parkinson, 1995. Only extant locality.

†118/25.6. Salvia verticillata *77, Lanarks.: Old bing, Hassockrigg, NS/87.63. K. J. Watson, 1993, **GL**. 1st record of naturalised population.

120/1.4. Callitriche platycarpa *77, Lanarks.: Deep ditch, Coulter, NT/01.34. P. Macpherson, 1992. R. Clyde, Thankerton, NS/97.38. P. Macpherson, 1993. 1st and 2nd records, both **herb. P.M.**, det. R. D. Meikle.

120/1.6. Callitriche brutia *12, N. Hants.: Dried-up bed of recently dredged pond, Woolmer Pond, SU/78.32. F. Rose, 1994.

121/1.3b. Plantago major subsp. intermedia *58, Cheshire: Saltmarsh, Neumann's Flashes, Northwich, SJ/667.650. G. M. Kay, 1992, **herb. G.M.K.**, conf. J. R. Akeroyd. *64, Mid-W. Yorks.: Grassland above edge of reservoir, Fairburn Ings, SE/469.276. Bradford Botany Group, 1995.

124/1.7. Verbascum thapsus †*108, W. Sutherland: Disturbed ground, Tongue village, NC/592.569. I. M. Evans, 1995.

124/1.7 × 12. Verbascum lychnitis × V. thapsus (V. × thapsi) *58, Cheshire: With parents on old sidings, Dukinfield, SJ/936.975. A. Franks & O. Kearns, 1993, conf. G. M. Kay.

124/1.9 × 12. Verbascum lychnitis × V. nigrum (V. × incanum) *58, Cheshire: With parents on old sidings, Dukinfield, SJ/939.975. G. M. Kay & E. & O. Kearns, 1993, **herb. G.M.K.**

†124/4.2 × 3. Mimulus guttatus × M. luteus (M. × robertsii) *77, Lanarks.: Well naturalised on bank of R. Clyde, Wolfclyde, NS/01.36. P. Macpherson, 1980, **herb. P.M.**, det. A. J. Silverside. Still present in 1995.

†124/4.2 × cup. MIMULUS CUPREUS × M. GUTTATUS (M. × BURNETII) *91, Kincardines.: Streamside, Glenbervie, NO/731.817. D. Welch, 1995, **ABD**.

†124/4.3 × cup. MIMULUS CUPREUS × M. LUTEUS (M. × MACULOSUS) *83, Midlothian: Locally frequent by Lugate Water, Stagehall, NT/44.44. R. Learmouth, 1986, det. D. R. McKean.

124/5.1. LIMOSELLA AQUATICA **6**, N. Somerset: Chew Valley Lake, ST/563.590, T. W. J. D. Dupree, 1995. 2nd record, and first since 1791. **59**, S. Lancs.: Exposed bed of Earnsdale Reservoir, SD/66.22. P. Jepson, 1995. Only extant locality. **99**, Dunbarton: Exposed mud by pond, Wards Low Ground, Loch Lomond National Nature Reserve, NS/44.87. J. Mitchell & N. J. Willby, 1995. 1st record since 1908.

†124/11.2. CYMBALARIA PALLIDA *78, Peebless.: Locally frequent on walls, Walkerburn, NT/360.370. M. E. Braithwaite *et al.*, 1994.

†124/11.3. CYMBALARIA HEPATICIFOLIA *40, Salop: Wall, Grinshill, SJ/515.238. T. Preece, 1994.

†124/16.18. VERONICA PEREGRINA **58**, Cheshire: Persistent garden weed, Eccleston, SJ/4.6. M. Stead, 1992, conf. G. M. Kay.

124/16.24a. VERONICA HEDERIFOLIA subsp. HEDERIFOLIA *79, Selkirks.: Arable field margin above Howden Burn, Selkirk, NT/456.267. R. W. M. Corner, 1995, **herb. R.W.M.C.**

124/18.1. SIBTHORPIA EUROPAEA **46**, Cards.: Flush in pasture and scrub N. of Afon Teifi W. of Pont Tyweli, Llandysul, SN/408.403. J. Bevan & A. O. Chater, 1995. 2nd extant locality.

124/20. EUPHRASIA. All the records below are based on determinations by A. J. Silverside.

124/20.1b. EUPHRASIA ROSTKOVIANA subsp. MONTANA *46, Cards.: Unimproved pasture, Caeau Llety-cybi Nature Reserve, Llangybi, SN/603.535. A. O. Chater, 1982, **NMW**. Hay meadow S. of Ty-mawr, Ysbyty Cynfyn, SN/756.789. A. O. Chater, 1990, **NMW**. 1st and 2nd records.

124/20.3 × 4. EUPHRASIA ANGLICA × E. VIGURSII *2, E. Cornwall: Edge of buildings near summit of Kit Hill, SX/374.713. E. H. Jackson & A. J. Silverside, 1994, **herb. A.J.S.** 1st British record.

124/20.5 × 7 × 18. EUPHRASIA ARCTICA × E. MICRANTHA × E. NEMOROSA *77, Lanarks.: Heathy knoll, Camphead, NT/02.21. P. Macpherson, 1995, **herb. P.M.**

124/20.1a × 9. EUPHRASIA CONFUSA × E. ROSTKOVIANA subsp. ROSTKOVIANA *46, Cards.: Acidic, sheep-grazed turf, Rhydtalog ruin, Soar y Mynydd, SN/791.521. A. O. Chater, 1995, **NMW**.

124/20.7 × 9. EUPHRASIA CONFUSA × E. NEMOROSA *46, Cards.: Grassland, Cribach Bay, R.A.E. site, Aber-porth, SN/249.520. A. O. Chater, 1993, **herb. A.O.C.** *77, Lanarks.: Short grass on old coal bing N. of Airdrie, NS/77.68. B. Jennett & P. Macpherson, 1995, **herb. P.M.**

124/20.9 × 18. EUPHRASIA CONFUSA × E. MICRANTHA *77, Lanarks.: Short upland heath on bank of Avon Water S. of Waterhead, NS/61.34. P. Macpherson, 1995, **herb. P.M.**

124/20.9 × 19. EUPHRASIA CONFUSA × E. SCOTTICA *50, Denbs.: Wet flush by stream, Gors Maen Llwyd, SH/974.576. W. Hay, 1993, **NMW**.

125/2.8. OROBANCHE HEDERAE †*61, S.E. Yorks.: On *Hedera* in garden, Cottingham, TA/04.32. M. Jordan, 1995, det. F. E. Crackles.

†126/1.1. RAMONDA MYCONI *64, Mid-W. Yorks.: Limestone scar, Ingleborough Hall estate, Clapham, SD/748.695. Yorkshire Naturalists' Union excursion, 1995.

†129/1.9. CAMPANULA PORTENSCHLAGIANA *40, Salop: Base of wall, Kingsland, Shrewsbury, SJ/485.121. R. M. Stokes, 1994.

†129/1.10. CAMPANULA POSCHARSKYANA *40, Salop: Coton Hill railway yard, Shrewsbury, SJ 492.136. R. M. Stokes, 1995.

130/6.6 × 7. GALIUM MOLLUGO × G. VERUM (G. × POMERANICUM) *40, Salop: Calcareous grassland, Hilltop Meadow, Wenlock Edge, SO/570.965. R. M. Stokes, 1994 & 1995.

130/6.7b. GALIUM MOLLUGO subsp. ERECTUM *91, Kincardines.: Railway cutting, Muchalls, NO/895.901. D. Welch, 1995, **ABD**.

131/2.2. VIBURNUM LANTANA †*91, Kincardines.: Shelter belt, Maryculter, NO/882.977. D. Welch, 1993.

†131/3. orb. × mic. SYMPHORICARPOS MICROPHYLLUS × S. ORBICULARIS (S. × CHENAULTII) *1, W. Cornwall: Roadside scrub near Tuckingmill, Camborne, SW/659.403. Old mining ground, Troon, SW/668.388. Both D. T. Holyoak, 1993. 1st and 2nd records.

†131/6.3. LONICERA INVOLUCRATA *73, Kirkcudbrights.: Wood, Rockcliffe, NX/84.54. O. M. Stewart, 1993.

†131/6.6. LONICERA JAPONICA *46, Cards.: Well established on long-abandoned allotment site, Feelin-y-mor Road, Aberystwyth, SN/581.805. A. O. Chater, 1994, **NMW**.

133/1.2. VALERIANELLA CARINATA *61, S.E. Yorks.: Wall, disused railway station, Keyingham, TA/248.259. W. R. Dolling, 1993.

133/1.3. VALERIANELLA RIMOSA 12, N. Hants.: Arable field near Bramdown Copse, Overton, SU/528.471. J. R. Moon, 1994, **herb. A. Brewis**, det. F. Rose. Only extant locality.

†135/1.3. ECHINOPS BANNATICUS 50, Denbs.: Riverside, Llangernyw, SH/877.674. W. McCarthy, 1995, **NMW**. 2nd record.

135/3.2c. ARCTIUM MINUS subsp. MINUS 73, Kirkcudbrights.: Edge of wood, Cairnsmore, NX/46.63. O. M. Stewart, 1993. Only extant locality.

135/6.3 × 9. CIRSIUM DISSECTUM × C. PALUSTRE (C. × FORSTERI) *43, Rads.: Meadow, Cors y Llyn National Nature Reserve, SO/01.55. R. G. Ellis, 1995, **NMW**. *46, Cards.: Pasture, Rhos Bwlch-y-rhandir, Llanilar, SN/593.733. J. Turner, 1994, det. R. F. John & Q. O. N. Kay.

135/6.6 × 9. CIRSIUM HETEROPHYLLUM × C. PALUSTRE (C. × WANKELII) *59, S. Lancs.: 2 km W. of Entwistle Railway Station, SD/70.16. P. Jepson, 1995, **LIV**. 1st English record.

135/15.2. HYPOCHAERIS GLABRA *46, Cards.: Sandy verges of track through dunes, Penyrergyd, Gwbert, SN/163.486. A. O. Chater, 1995, **NMW**.

135/16.1b. LEONTODON AUTUMNALIS subsp. PRATENSIS *58, Cheshire: Roadside verge, Cat and Fiddle Inn, Goyts Moss, SD/001.718. G. M. Kay, 1993.

135/22.1. LACTUCA SERRIOLA †*47, Monts.: Waste ground by road, Abermule, SO/162.953. P. H. Oswald, 1995.

135/22.2. LACTUCA VIROSA †*47, Monts.: Bank by new road, Llanidloes, SN/954.839. P. H. Oswald, 1995.

†135/27.6b. PILOSELLA AURANTIACA subsp. CARPATHICOLA 50, Denbs.: Waste ground, Llanrwst, SH/795.623. G. Battershall, 1995. Only extant locality. *75, Ayrs.: Abandoned railway embankment, Kilbirnie, NS/32.54. A. McG. Stirling & K. J. Watson, 1995.

135/28.11. HIERACIUM RETICULATUM *77, Lanarks.: Old spoil heap near Beattock Summit, NS/10.13. D. J. McCosh, 1988, **BM**, conf. P. D. Sell.

135/28.13. HIERACIUM DRUMMONDII , *73, Kirkcudbrights.: Wide grassy verge, Holm of Dalquairn, Carsphairn, NX/556.940. O. M. Stewart, 1994, **E**.

135/28.34. HIERACIUM SPARSIFOLIUM *46, Cards.: Gravelly turf, Mynach Vale leadmine, Devil's Bridge, SN/772.775. A. O. Chater, 1994, **NMW**, det. P. D. Sell.

135/28.45. HIERACIUM SCOTICUM *46, Cards.: Dry acidic cliffs, Nant Myherin, Ponterwyd, SN/798.806. A. O. Chater, 1991, **NMW**, det. P. D. Sell.

135/28.58. HIERACIUM POLLICHIAE †*46, Cards.: Ballast of disused railway behind Penyrangor, Aberystwyth, SN/581.808. A. O. Chater, 1993, **NMW**, det. P. D. Sell. 1st Welsh record. Site destroyed in 1994.

135/28.68. HIERACIUM CHERIENSE *46, Cards.: Shaded roadside hedgebank by Sarn Helen, Llangeitho, SN/640.589. A. O. Chater, 1994, **NMW**, det. P. D. Sell.

135/28.94. HIERACIUM SUBHIRTUM *77, Lanarks.: Breeks Burn, Culter Fell, NT/04.27. D. J. McCosh, 1995, **herb. D.J.McC.**

135/28.106. HIERACIUM SANGUINEUM *77, Lanarks.: Riverside rocks between Bonnington Linn and Corra Linn, NS/88.41. D. J. McCosh, 1988, **herb. D.J.McC.**, conf. P. D. Sell.

135/28.107. HIERACIUM PSEUDOSARCOPHYLLUM *77, Lanarks.: Side of burn on flanks of Culter Fell, NT/04.27. D. J. McCosh, 1984, **herb. D.J.McC.**, conf. P. D. Sell.

135/28.109. HIERACIUM CYMBIFOLIUM *77, Lanarks.: Riverside rock slab, Corra Linn, NS/88.41. D. J. McCosh, 1988, **herb. D.J.McC.**, conf. P. D. Sell.

†135/28.115. HIERACIUM SCOTOSTICTUM *9, Dorset: Above Sailing Centre, Weymouth, SY/6.7. M. C. Sheahan, 1995, det. R. M. Burton.

135/28.140. HIERACIUM EXOTERICUM *77, Lanarks.: Waste ground near station, Auchenheath, NS/80.43. A. McG. Stirling, 1968, **CGE**, det. D. J. McCosh.

135/28.176. HIERACIUM DICELLA *77, Lanarks.: Corra Linn, NS/88.41. D. J. McCosh, 1988, **herb. D.J.McC.**, conf. P. D. Sell.

†135/28.187. HIERACIUM PULMONARIOIDES *58, Cheshire: Wall of bridge, Ashton-upon-Mersey, SJ/794.933. M. P. G. Tolfree, 1992. Has spread from sites in v.c. 59 on other side of river.

135/28.197. HIERACIUM FLOCCULOSUM *77, Lanarks.: Vertical rocks, Falls of Clyde, NS/882.418. D. J. McCosh, 1988, **herb. D.J.McC.**, conf. P. D. Sell.

135/28.203. HIERACIUM DASYTHRIX *77, Lanarks.: Near penstocks of Power Station, Falls of Clyde, NS/88.41. D. J. McCosh, 1988, **herb. D.J.McC.**, conf. P. D. Sell.

135/30.4. FILAGO MINIMA *58, Cheshire: Old sand quarry, Wybunbury, SJ/708.493. A. Blacklay, 1991, **herb. G. M. Kay**. 1st record since 1927.

135/33.2. GNAPHALIUM SYLVATICUM 75, Ayrs.: *Calluna-Vaccinium* heath, Mochrum Hill, NS/265.098. J. Blane, 1995. 2nd extant locality.

†135/35.1. INULA HELENIUM *91, Kincardines.: Alder wood on island in R. Dee, Maryculter, NJ/866.009. D. Welch, 1995.

135/40.1 × †3. SOLIDAGO CANADENSIS × S. VIRGAUREA (S. × NIEDEREDERI) *58, Cheshire: Railway bank, Dukinfield, SJ/935.974. G. M. Kay, 1995, det. R. M. Burton & C. A. Stace.

†135/40.4a. SOLIDAGO GIGANTEA subsp. SEROTINA 38, Warks.: Side of canal, Emscote, SP/296.656. J. C. Bowra, 1995, **WAR**, det. D. H. Kent. 2nd record.

†135/41.2. ASTER NOVAE-ANGLIAE *40, Salop: Waste ground near Greenfields, Shrewsbury, SJ/497.140. R. M. Stokes, 1994. Waste ground near Condover, SJ/493.065. S. J. Whild, 1995. 1st and 2nd records.

†135/41.3 × 4. ASTER LAEVIS × A. NOVI-BELGII (A. × VERSICOLOR) *40, Salop: Steep railway embankment, Oakengates, Telford, SJ/698.106. R. M. Stokes, 1994.

†135/41.4. ASTER NOVI-BELGII *67, S. Northumb.: Bank of R. South Tyne, Bardon Mill, NY/781.642. P. F. Yeo, 1994. Bank of R. South Tyne, NY/683.517. G. A. & M. Swan, 1994, **herb. G.A.S.**, det. P. F. Yeo. 1st and 2nd records.

†135/41.5. ASTER LANCEOLATUS *58, Cheshire: Marl pit, Disley, SJ/985.844. J. Guest, 1991, **herb. J.G.**, det. P. F. Yeo.

†135/43.1. ERIGERON GLAUCUS *50, Denbs.: Side of A55 road, Old Colwyn, SH/86.78. G. Battershall, 1995. 1st Welsh record. *75, Ayrs.: Sandy bank near shore near Seamill golf course, NS/196.475. A. Rutherford & A. McG. Stirling, 1995, **GLAM**.

135/54.1. CHAMAEMELUM NOBILE †71, Man: Trackside and waste ground, The Raggatt, Patrick, SC/245.827. L. S. Garrad, 1994. 2nd record.

†135/55.4. ANTHEMIS TINCTORIA 1, W. Cornwall: Spoil over mine waste, Wheal Seaton, Camborne, SW/649.414. C. N. French, 1995, det. D. T. Holyoak. 2nd record. *71, Man: Ballacallow Civic Amenity Area (i.e. tip), NX/461.040. M. Devereau, 1994.

†135/58.lac. × max. LEUCANTHEMUM LACUSTRE × L. MAXIMUM (L. × SUPERBUM) 50, Denbs.: Waste ground, Llanrwst, SH/795.623. G. Battershall, 1995. 2nd record.

135/59.1. MATRICARIA RECUTITA 108, W. Sutherland: Roadside verge, Achmelvich, NC/058.246. P. A. & I. M. Evans, 1995. 2nd record.

135/60.1 × 2. TRIPLEUROSPERMUM INODORUM × T. MARITIMUM *1, W. Cornwall: Disturbed ground near Gwithian Towans, SW/581.407. D. T. Holyoak, 1993.

†135/61.4. COTULA SQUALIDA *64, Mid-W. Yorks.: Short *Festuca* turf by moorland trackside, Dallow Moor, SE/192.691. P. P. Abbott, 1995. 1st record of naturalised population.

†135/62.1. SENECIO CINERARIA *52, Anglesey: Limestone cliff by sea, Benllech, SH/523.829. B. Ducker, 1995.

135/62.†1 × 10. SENECIO CINERARIA × S. JACOBAEA (S. × ALBESCENS) *58, Cheshire: Wall of canal, Marple, SJ/961.885. A. R. Franks & J. Lowell, 1993, conf. G. M. Kay.

†135/62.3. SENECIO INAEQUIDENS *13, W. Sussex: Pavement weed, Yapton, SU/974.034. D. M. Donovan, 1992, det. J. M. Mullin. Roadside verge, Bramber, TQ/197.096. B. & R. I. Clough, 1995, **herb. B.C.**, det. E. J. Clement.

135/62.†13 × 15. SENECIO SQUALIDUS × S. VULGARIS (S. × BAXTERI) *12, N. Hants.: New Road, Basingstoke, SU/63.51. D. E. Allen, 1992.

†135/62.16. SENECIO VERNALIS *5, S. Somerset: Plentiful on newly sown verge, Cannington, ST/254.390. P. R. Green, 1994.

†135/69.1. DORONICUM PARDALIANCHES *58, Cheshire: Entries for *D. plantagineum* in A. Newton, *Supplement to Flora of Cheshire* p. 32, refer to *D. pardalianches*.

†135/69.2. DORONICUM PLANTAGINEUM *75, Ayrs.: Wood by R. Irvine, Shewalton, NS/347.367. K. J. Watson, 1993, **GLAM**, det. E. J. Clement.

†135/69.1 × 2 × 3. DORONICUM COLUMNAE × D. PARDALIANCHES × D. PLANTAGINEUM (D. × EXCELSUM) *29, Cambs.: Copse on edge of estate, The Hall, Six Mile Bottom, TL/584.572. J. C. A. Rathmell, 1995, **CGE**, conf. D. E. Coombe as cultivar 'Harpur-Crewe'.

†135/71.2. PETASITES JAPONICUS *42, Brecs.: River bank near Builth Wells, SO/032.515. I. Standish & R. G. Woods, 1995.

†135/80.2. GALINSOGA QUADRIRADIATA *46, Cards.: Flowerbed, Aberystwyth promenade, SN/583.823. S. P. Chambers, 1994.

†138/6.1. LAGAROSIPHON MAJOR *40, Salop: Small pond, Llynclys Common, SJ/270.231. R. M. Stokes, 1995.

142/1.7. POTAMOGETON ALPINUS *51, Flints.: Pond in disused limestone quarry, Llanfynydd, SJ/281.560. J. Phillips, 1994, det. N. T. H. Holmes & C. D. Preston. 2nd record.

†147/1.1. LYSICHITON AMERICANUS *40, Salop: Edge of stream, Horsehay, Telford, SJ/673.074. R. M. Stokes, 1995.

†147/5.2b. ARUM ITALICUM subsp. ITALICUM *40, Salop: Roadside hedge, Claverley, SO/796.944. S. O'Donnell, 1995.

†148/2.4. LEMNA MINUTA *42, Brecs.: Edge of lake, Tal-y-llyn, SO/133.262. M. Porter, 1993. *47, Monts.: Montgomery Canal, Welshpool, SJ/227.074. I. C. Trueman, 1995. Montgomery Canal, Walls Bridge, Llanymynech, SJ/262.208. M. Wainwright, 1995. 1st and 2nd records.

151/1.10. JUNCUS CAPITATUS 52, Anglesey: Damp sand near Valley, SH/3.7. T. H. Blackstock, 1995. Only extant locality, at site where species was originally found in Anglesey in 1915.

151/2.6b. LUZULA MULTIFLORA subsp. CONGESTA *77, Lanarks.: Grassland by A74 road N. of Beattock Summit, NS/9.1. P. Macpherson, 1993, **herb. P.M.**

152/3.1 × 3. ELEOCHARIS PALUSTRIS × E. UNIGLUMIS *1, W. Cornwall: With *E. palustris* in dune slack by Penhale Sands, SW/780.571. D. T. Holyoak, 1994, conf. S. M. Walters.

152/16.8b. CAREX MURICATA subsp. LAMPROCARPA 77, Lanarks.: Abandoned industrial site, Cessnock, NS/56.64. P. Macpherson & O. M. Stewart, 1995, **herb. P.M.**, det. A. O. Chater. 1st record this century.

152/16.9b. CAREX DIVULSA subsp. LEERSII *77, Lanarks.: Steep bank above R. Clyde, Blantyre, NS/69.58. K. J. Watson, 1988, **GLAM**. Still present in 1995.

152/16.11. CAREX DISTICHA 91, Kincardines.: Marsh, Hill of Garvock, NO/728.686. Marsh by shore, Muchalls, NO/899.908. Both D. Welch, 1995, **ABD**. 1st and 2nd post-1930 records.

152/16.18. CAREX DIOICA *71, Man: Open area in willow carr, Ballaugh Curraghs, SC/365.943. L. S. Garrad, 1991. Only extant locality, the others having been bulldozed (Rhendhoo) or overgrown by scrub (Loughcroute).

152/16.23. CAREX HIRTA 91, Kincardines.: Marsh, Fetteresso, NO/803.850. D. Welch, 1995, **herb. D.W.** 1st post-1930 record.

152/16.34. CAREX STRIGOSA *38, Warks.: Mixed woodland, Kenilworth, SP/304.708. R. C. Palmer, 1995, **WAR**, det. J. C. Bowra. 2nd record, and 1st since 1873.

152/16.54 CAREX MONTANA *46, Cards.: Rocky slope by Nant Cnwch-gwyn near confluence with Afon Doethie, SN/759.518. A. O. Chater & J. P. Woodman, 1995, **NMW**. Rocky slope, Banc Hendre'r-dail, Llyn Brianne, SN/794.513. A. O. Chater & D. Davies, 1995. 1st and 2nd records.

152/16.57. CAREX LIMOSA *92, S. Aberdeen: Loch Kinord, NO/4.9. E. Norman, 1987, **herb. K. M. Fallowfield**.

152/16.59a. CAREX MAGELLANICA 46, Cards.: *Sphagnum*-dominated areas in level mire, Bryn yr Hyrddod, SN/808.689. A. O. Chater, 1995, **NMW**. 2nd record.

†153/4.1. SASAELLA RAMOSA *1, W. Cornwall: By track in woodland, Tehidy Country Park, SW/641.432. D. T. Holyoak, 1994.

†153/12.5. FESTUCA HETEROPHYLLA *99, Dunbarton: Edge of tarmac car park, Pierhead, Helensburgh, NS/29.82. A. McG. Stirling, 1995, **GLAM**.

153/12.7c. FESTUCA RUBRA subsp. LITTORALIS *2, E. Cornwall: Saltmarsh, St John's Lake, SX/412.541. R. W. Gould, 1989, det. A.-K. Al-Bermani.

153/12.7g. FESTUCA RUBRA subsp. MEGASTACHYS *51, Flints.: Disused railway, Meliden, SJ/058.803. J. A. Green, 1993, det. C. A. Stace.

153/13.1 × 2. LOLIUM MULTIFLORUM × L. PERENNE (L. × BOUCHEANUM) *46, Cards.: Scattered weed in potato field, Tygwyn, Mwnt, SN/197.521. A. O. Chater, 1995, **NMW**.

153/14.3. VULPIA MYUROS *91, Kincardines.: Abandoned railway yard, Stonehaven, NO/863.862. D. Welch, 1995, **herb. D.W.**, conf. C. A. Stace.

153/14.5. VULPIA UNILATERALIS 6, N. Somerset: Abundant on wall-top, Upton, ST/456.269. P. R. Green, 1994, **herb. P.R.G.** 2nd record, and 1st since 1937.

†153/18.10. Poa palustris *3, S. Devon: By Hayes Brook, Combe Raleigh, ST/169.028. N. T. H. Holmes, 1988. Marsh, Jetty Marsh, Newton Abbot, ST/860.723. Devonshire Association meeting, 1995, det. J. R. Edmondson. 1st and 2nd records.

153/20.1. Catabrosa aquatica **77**, Lanarks.: Old mill lade, New Lanark, NS/88.42. O. M. Stewart & A. McG. Stirling, 1989. Not refound after clearance of lade. Ledge just above R. Clyde, Newton, NS/66.61. K. J. Watson, 1990, **GL**. Only extant locality. **99**, Dunbarton: Wet seepage by sea-wall, Craigendoran Pier, NS/30.81. A. Rutherford & A. McG. Stirling, 1995, **GLAM**.

153/28.3. Avena fatua *75, Ayrs.: Weedy roadside verge, Woodland Bay, Girvan, NX/17.95. A. Rutherford & A. McG. Stirling, 1995.

153/28.4a. Avena sterilis subsp. ludoviciana *46, Cards.: One plant on manure heap, N. side of A44 road W. of Pentre, SN/634.811. S. P. Chambers, 1993, **NMW**, det. A. O. Chater.

153/32.1b. Deschampsia cespitosa subsp. parviflora *17, Surrey: Streamside, Collickmoor Wood, TQ/151.459. S. K. Bosher, 1994, det. E. J. Clement.

†153/39.9. Agrostis scabra *58, Cheshire: Old sidings, Dukinfield, SJ/936.975. G. M. Kay, 1993, **herb. G.M.K.**

†153/46.2. Polypogon viridis *59, S. Lancs.: Greenhill Nursery, Garston, SJ/404.855. W. McCarthy, 1995, det. A. D. Bradshaw.

153/47.4. Alopecurus aequalis *3, S. Devon: Ditch, Matford, Exeter, SX/926.897. R. Takagi-Arigho, 1995, **herb. R.T.-A.**, det. T. A. Cope.

153/50.2 × 3. Bromus commutatus × B. racemosus *1, W. Cornwall: With both parents on verge of A3083 road, Penhale, SW/696.183. D. T. Holyoak, 1994, det. T. A. Cope.

†153/53.1. Ceratochloa carinata *46, Cards.: Farmyard, Lloegr-fach, Aber-arth, SN/493.621. D. E. Allen & A. O. Chater, 1995, **NMW**.

†153/9.3. Hordeum jubatum 75, Ayrs.: Verge of A78 road between Hunterston and West Kilbride, NS/20.51. A. Rutherford & A. McG. Stirling, 1995. 2nd record.

†153/68.1. Echinochloa crus-galli *50, Denbs.: Waste ground, Ruabon, SJ/290.434. B. Formstone, 1995, **NMW**, det. B. Wurzell.

154/1.1a. Sparganium erectum subsp. erectum *58, Cheshire: Canal bank, Croughton, SJ/420.725. J. E. Hawksford, 1995.

155/1.1. Typha latifolia *108, W. Sutherland: Small roadside quarry between Moine House and Kyle of Tongue, NC/538.601. P. Smith, 1995.

†158/10.1. Tulipa sylvestris 5, S. Somerset: Large patches on bank of R. Yeo, Long Load, ST/460.244. J. Burrell, 1991. 2nd record. *91, Kincardines.: Streamside in policy woodland, Inglismaldie, NO/644.667. J. Kidston, 1995, det. D. Welch.

158/15.1. Maianthemum bifolium †*64, Mid-W. Yorks.: Woodland at top of stream bank, Ingleborough Hall estate, Clapham, SD/750.699. Yorkshire Naturalists' Union excursion, 1995.

†158/19.1. Scilla bifolia *40, Salop: Woodland, Badger Dingle, SO/771.994. S. O'Donnell, 1995.

†158/20.1. Hyacinthoides italica *75, Ayrs.: Bourtreehill, Irvine, NS/343.359. K. J. Watson, 1993, **GLAM**, conf. E. J. Clement.

†158/22.1. Chionodoxa forbesii *58, Cheshire: Hedgerow by church, Ince, SJ/450.764. J. E. Hawksford, 1995.

†158/23.2. Muscari armeniacum *1, W. Cornwall: Rough grassland on dune complex, Common Towans, Hayle, SW/561.386. G. A. Griffiths & D. T. Holyoak, 1993. Lelant churchyard, SW/547.376. G. A. Griffiths & D. T. Holyoak, 1994. 1st and 2nd confirmed records.

†158/24.9. ALLIUM PARADOXUM *67, S. Northumb.: ditch, Military Road near Port Gate, NY/964.691. D. & T. Hardy, 1994, **herb. G. A. Swan**.

†158/24.12. ALLIUM CARINATUM *59, S. Lancs.: By canal, Aqueduct, Ewood, SD/676.265. P. Jepson, 1995. Known here for several years.

158/24.14. ALLIUM SCORODOPRASUM †*3, S. Devon: Roadside bank near Fingle Bridge, SX/750.915. B. P. Thurlow, 1995, det. L. J. Margetts. 1st confirmed record.

†158/24.17. ALLIUM NIGRUM *5, S. Somerset: Hedgebank, Kingston St Mary, ST/235.288. P. R. Green, 1994.

158/32.1 × †4. GALANTHUS NIVALIS × G. PLICATUS *1, W. Cornwall: Ludgvan churchyard. SW/506.332. D. T. Holyoak, 1994. *17, Surrey: Cemetery, The Mount, Guildford, SU/991.490. A. C. Leslie, 1995.

†158/32.4a. GALANTHUS PLICATUS subsp. PLICATUS *1, W. Cornwall: Swanpool Cemetery near Falmouth, SW/803.316. Ludgvan churchyard, SW/506.332. Both D. T. Holyoak, 1994. 1st and 2nd records.

†159/2.5. SISYRINCHIUM STRIATUM *5, S. Somerset: Railway bank, Minehead, SS/977.461. P. R. Green, 1995.

†159/5.2. IRIS SIBIRICA *58, Cheshire: Damp field, Alderley Edge, SJ/852.777. J. W. Rayner, 1990, conf. G. M. Kay.

†159/8.2. CROCUS TOMMASINIANUS *46, Cards.: Rough grassland in chapel graveyard, Blaennerch, SN/247.490. A. O. Chater, 1994. Lawns, Welsh Agricultural College, Llanbadarn Fawr, SN/602.811. S. P. Chambers, 1994. 1st and 2nd records.

†159/13.1. CROCOSMIA PANICULATA *1, W. Cornwall: Large patches on laneside verge, Carnkie, SW/686.396. D. T. Holyoak, 1993. *2, E. Cornwall: Waste ground, New Polzeath, SW/936.795. H. C. Watts, 1994, conf. R. J. Murphy.

162/3.5. EPIPACTIS YOUNGIANA 67, S. Northumb.: Near Killingworth, NZ/2.7. L. A. Kergon & S. P. Davison, 1995, det. A. J. Richards. 2nd extant locality.

162/10.1. HAMMARBYA PALUDOSA *2, E. Cornwall: *Sphagnum* bog, Pendrift Downs, SX/110.743. P. A. Gainey, 1995. 2nd extant locality.

162/16.1. GYMNADENIA CONOPSEA 45, Pembs.: Coarse neutral grassland at edge of scrub on sea-cliff, Stack Rocks, SR/926.946. R. J. Haycock & S. Mackie, 1995. 2nd extant locality.

162/16.1 × 18.2a. GYMNADENIA CONOPSEA × DACTYLORHIZA MACULATA subsp. ERICETORUM (× DACTYLODENIA LEGRANDIANA) *77, Lanarks.: Douglas, NS/82.31. K. J. Watson, 1994.

Book Reviews

Atlas florae Europaeae, Vol. 11, *Cruciferae* (Ricotia *to* Raphanus). Edited by J. Jalas, J. Suominen & R. Lampinen. Pp. 310. Committee for Mapping the Flora of Europe & Societas Biologica Fennica Vanamo, Helsinki. 1996. Price not stated. ISBN 951–9108–11–4.

The botanical public has become accustomed to the stately progress of the *Atlas florae Europaeae* project, which at the present rate will take about three working lifetimes to complete. This eleventh volume, comprising the tribes *Alysseae*, *Lepidiae* and *Brassiceae*, amply shows the strengths and weaknesses of the project.

The *Cruciferae* present great problems for the mapper. Not only is there still widespread disagreement about generic and specific limits, but many are weeds or weedy, so that their native range is unclear. Given these problems, the editors have steered a middle course, following the 1993 edition of *Flora Europaea* quite closely, but with a good deal of lumping and splitting as well as the inclusion of some additional taxa. The last map in the volume, of *Raphanus raphanistrum* subsp. *landra* including subsp. *maritimus*, exemplifies many of these problems. It is mapped throughout Bulgaria but vanishes in Romania, from which no data were received during the mapping period.

The amount of work involved in producing this volume was clearly huge, Numerous taxa, including *Brassica napus*, *Raphanus sativus* and the segregates of *Erophila verna* have extensive notes but are not mapped at all, whereas *Brassica repanda*, with a distribution ranging from southern Spain to the western Alps, is mapped not only as a species, but also as 14 subspecies, most of which are endemic to Spain and France. The resulting notes on nomenclature, taxonomy, cytology and distribution are voluminous.

Most British botanists will want to know the European distribution of their relatively uncritical species, and it is disappointing to find so much space devoted to subspecific and otherwise obscure segregates. For example, *Cakile maritima* is not given a species-level map, but is mapped as four subspecies on three separate pages. The inclusion of obscure segregates, most of which will presumably not stand the test of time, is perhaps at its worst in *Biscutella*, with a whole page (p. 197) devoted to mapping six newly-described Spanish endemics which the editors admit are not fully understood yet.

One is forced to ask what audience this expansive volume is addressing: is it for plant hunters and ecologists, who want an overview of distribution, or is it for the taxonomic tigers? Europe needs a mapping scheme more like that of the B.S.B.I.

M. O. Hill

Flora Britannica. R. Mabey. Pp. 480. Sinclair-Stevenson, London. 1996. Price £30.00. ISBN 1–85619–377–2.

If publishers' hyperbole were applied to food, medicines or household gadgets it would justly fall foul of the Trades Descriptions Act. Three years after a book describing "over 2500 species", yet falsely claiming to be "a complete guide to the flowers of the Mediterranean", comes *Flora Britannica*, said on the dust jacket to be "the definitive new guide to wild flowers, plants and trees". Richard Mabey's magnum opus is certainly not that, but an accurate descriptor is not easily found. The dust jacket goes on to offer "contemporary flora", "a sort of Domesday book", "register for the end of the twentieth century", "cultural flora" and "new flora for the people". However described, it had no need for hyperbole, for the truth would be complimentary enough.

Most of the text consists of short sections, one per family and in systematic sequence, but interspersed are ten special sections on such topics as hedges, spring festivals, wild foods, plant medicines and plant and place names. 'Britannica' is interpreted in almost its exact sense (Ireland

and the Channel Islands are not covered). Within the sections the plants included are the wild plants of Britain (plus the Isle of Man) that have an interesting story to tell in the context of this "encyclopaedia of living folklore". Hence many aliens are included (e.g. *Cannabis*, *Araucaria*), but many of the rarer or more obscure natives (e.g. *Diapensia*, *Sparganium*) are not mentioned. Latin and English (and, where relevant, Scottish) names are given more or less equal prominence throughout.

The text is authoritatively, interestingly and delightfully written; I found it compulsive reading and would be surprised if any plant-lover could find it other than extremely enjoyable and informative. It is also superbly illustrated by nearly 500 colour photographs, many of them highly evocative, whether they be *Saxifraga oppositifolia* on Pen-y-Ghent, Western Gorse and Bell Heather on Anglesey, or the pale sun shining through hazel catkins.

Data for inclusion in *Flora Britannica* were intensively researched and collected for five years, during which the author actively sought the views and experiences of the enlightened general public. Much of the text has come via this route, frequently placed in quotes. The downside of this approach is that areas from which little response was received are under-represented. There is, overall, a detectable southern bias to the book, which disappointed me somewhat. For sure, the northern moors and mountains get their share of attention, but one gains the impression that Britain 'north of Watford Gap' was visited only where necessary, i.e. where the south could not provide the examples. This is, however, not an amateurish mish-mash as are so many books on the fringes of botany, but a scientifically-based and fully sourced (twelve close-printed pages) reference work. Obvious errors are very few and I shall mention only one: the picture on p. 13 is clearly *Equisetum telmateia* and not *E. arvense* as stated in the first printing.

In trying to convey the contents of this book I am reminded of part of the blurb on the dust jacket of David McClintock's (in some ways not dissimilar) *Companion to flowers* (1966): "To attempt to describe this book in a short space is like trying to give an impression of the contents of the National Gallery on a postcard". It describes those aspects of plants that come to man's attention and thereby cause them to be used as food, medicines, fuel, tools, decorations, omens and in countless other ways, from economically important resources to groundless and extinct mythologies. The story told is rarely short of fascinating, and goes a long way to support Mabey's contention that we still have strong connexions with our wild flora and that that connexion should be cherished.

Flora Britannica wisely "does not claim to be the last word on the current role of plants in British culture". Anyone with an intimate knowledge of the British flora could add hundreds of relevant comments and anecdotes, and probably they should have done so; blame for omissions can hardly be placed at the feet of an author who went out of his way to elicit contributions from all and sundry. Perhaps the most surprising omission (to me) is the lack of any meaningful coverage of well-dressings, which are still (even increasingly) a major event in the community life of many Derbyshire villages and which would have provided a rich source of beautiful illustrations. A random assortment of other points that immediately occurred to me are: the absence of *Lychnis flos-cuculi* from a list of 'cuckooflowers'; no mention in the longish section on hop of its old use as rope; omission of reference to the now widespread use of cereal and oilseed-rape straw as fuel; no indication of the restricted area of native butterbur shown by the presence of both sexes and no mention of the planting of male plants as pollen-sources for early bees. The long section on *Fallopia japonica* does not describe its important use by youngsters as an unparalleled source of pea-shooters; my own experiences as a member of a gang of 7-year-olds using colonies of this plant as a secret den and as weapons date from Kent in the mid-1940s, 20 years before the similar story related by the author from a Bristolian contributor.

But I find this one of the main joys of *Flora Britannica* – it is a friendly book that one can relate to, compete with and add to. Mabey hopes that "it will trigger as many responses as it records" and I believe that it will. Indeed, I feel that the extent to which it does will measure the truth in the dust-jacket's assertion that it "is one of the most important books about Britain's plants to be published this century". If the author's hopes and my feelings are fulfilled, then Mabey will be writing an even more important sequel early next century. Meanwhile, we should be grateful to him for this feast of stories about our wild flora. I recommend anyone who has not been given it for Christmas 1996 to go out and buy it.

C. A. Stace

Alan Mitchell's Trees of Britain. A. Mitchell. Pp. 368. Harper Collins Publishers, London. 1996. £14.99. ISBN 0–00–219972–6.

Trees, despite their size and prominence, are curiously over-looked (or under-looked!) in botanical surveys. Yet, according to Clement & Foster's *Alien plants of the British Isles* (1994), over 300 non-native tree species have been recorded growing somewhere in the British Isles. This volume, written by Alan Mitchell, who until his death in 1995 was perhaps the foremost dendrologist in Britain, is essentially a series of monographs of selected tree species which grow in Britain and Ireland. Mostly, these deal with trees in cultivation but many of the species covered may be encountered in the wild.

Mitchell, like myself, served with the Fleet Air Arm (albeit 40 years earlier) and was later trained as a forester, latterly working as the Forestry Commission Dendrologist at the Alice Holt Research Station. One of his most notable achievements was setting up the Tree Register of the British Isles where the largest (tallest and broadest) specimens were (and continue to be) recorded, and much of the information in this volume was accrued during data collection for this monumental project. This book was written to complement his classic work, the *Collins field guide to the trees of Britain and Northern Europe* (1974), first published over 20 years ago but still much used (and reprinted) today.

Some 150 species of trees are covered in what the publishers term a culmination of Alan Mitchell's life's work. The book is arranged by species, starting with coniferous trees. There is a brief introduction comprising a couple of paragraphs by Keith Rushforth, then another two and a half pages by Mitchell himself where estimating the age and height of trees is discussed.

The species accounts vary in their detail but almost all of them comprise a description of the visual and horticultural merits of the species, the date of introduction and by whom, the natural distribution, and some anecdotes mainly concerning the collectors or nurserymen who were responsible for planting the trees in the first instance. For example, the Lucombe oak (*Quercus lucombeana*) was first raised by William Lucombe at his nursery in Exeter. Lucombe introduced the first turkey oak (*Q. cerris*) and having sown the first yielded seeds discovered one specimen unlike the others – it was semi-evergreen and more vigorous. As a hybrid of the cork oak (*Q. suber*) and turkey oak, this tree had soon reached 21 feet high [6·4 m] with a girth of 1 foot 8 inches [0.5 m]. He promptly cut down this first tree (he had planted a number of others by then) as he was of "advanced years" and wanted to be buried in a coffin made of timber from this tree. However, Lucombe was made of tough stuff and the planks beneath his bed rotted long before his death. Some time later he felled another of the trees and subsequently died at the age of 102 – he was buried in these newer planks.

The final section of the book lists places to visit to view trees, with particular emphasis on rarities or large and notable specimens. These are arranged by country, then by county with the name of the garden or estate and the nearest town or city. Frustratingly, there are no grid references and it is assumed that the name of the place and nearest town or city is sufficient to locate it.

Alan Mitchell was well known for his intolerance of fools, his dislike of bureaucracy and his utter distaste for purple varieties of trees! These traits show through in the text. As does his pragmatic approach to the botany of trees – why use a long word when a short one will do? Why change a perfectly acceptable name such as *Larix* × *eurolepis* or *Quercus lucombeana*? In fairness, Mitchell always accepted the reasoning behind taxonomic reviews. Was there anyone who had more belief in the conservation of names?

Anyone who has read Mitchell's field guide will be familiar with his unorthodox descriptive style – especially where colours of foliage or other parts of the plant are concerned. This book follows in the same vein. This could be a little irritating for those who like the correct botanical terms or most up-to-date taxonomy. But, in my view, it does not detract from the value of the book as a celebration of some of the trees which have been introduced to Britain and Ireland over the last 400 years. This is by no means a classic botanical work but, as a tree specialist, I found it a fascinating read and very worthy of a place in my dendrological library.

C. S. Crook

Flora of Ashdown Forest. T. Rich *et al.* Pp. 256. Sussex Botanical Recording Society. 1996. Price £15.00. ISBN 0–9522987–1–6.

The twelve authors of this outstandingly interesting Flora tell us that they had two aims, so this review will be in two parts. The first aim, "to document the flora of a superb area of East Sussex and enjoy ourselves doing it", has been handsomely achieved, and the enjoyment has been successfully communicated to the reader. The area involved is only 71 1-km squares, mostly heathland, semi-natural woodland and valley bog. The introductory material gives a good account of geology, soils, ecology and management of habitats and conservation, but there is disappointingly little on history. The account of the dilemmas of management of a heathland site such as this is particularly informative. The National Vegetation Classification is neither used nor mentioned. A total of 916 taxa are treated, and are either mapped on a 1-km grid or have all their sites listed. The main survey was done in 1993–1995, but records back to 1987 are included on the maps (though this is nowhere clearly stated). So far as possible, historical records are discussed, and comparisons are always made with P. C. Hall's *Sussex plant atlas* (1980). The species accounts are very well written, and for a flavour of their originality and interest the prospective purchaser should try those on *Anemone nemorosa*, *Oxalis acetosella* or *Hypericum elodes*. The engrossing account of *Genista pilosa* runs to two pages. Critical groups and infraspecific taxa are covered with unusual thoroughness, and in only a few groups such as the hybrid poplars, *Odontites vernus* and *Rhinanthus minor* have the authors chickened out. Useful identification hints are given in a few cases (but in the *Hedera helix* subspecies the hair characters are given the wrong way round). General British and even world distributions are always given. The format is A4 hardback and the book is excellent value for money. It joins the select group of local Floras that should be on the shelf of anyone interested in the British flora, irrespective of whether or not they are interested in the particular area covered.

The second aim of the authors was "to demonstrate that it is practical to carry out a large scale botanical survey in a standardised manner". This was done by following the recommendations in T. C. G. Rich & P. A. Smith, *Watsonia* **21**: 161–173 (1996), chiefly involving achieving even coverage by recording for the same number of hours in each square, by visiting as many habitats as possible in each square, getting as many of the recorders as possible to visit each square, to improve their identification skills and to ensure adequate seasonal coverage. To these ends, a mean of 11 hours was spent in each 1-km square, with a mean of 8 visits by 6·5 botanists. Maps show the habitats recorded in each square, e.g. ancient woodland, scrub, churchyards, car parks, heathland, etc. Between 165 and 365 taxa were recorded from each square, with an average of 258. The data collected were investigated for recording bias, judged by below average proportions of grasses, common species and critical taxa, and the interpretation put on the statistics is that by the end of the survey species-richness on the maps reflected the variation in the environment and not variation in the recording. TWINSPAN analysis suggested the same conclusion. The authors claim that "this flora therefore sets new standards for recording in Britain, and it is recommended that all future atlases should follow a similar approach. The methods can be applied to areas of any size, and allow direct comparison with subsequent standardised surveys to assess change".

One must applaud the authors for putting their idea of a standardised repeatable survey into practice, but their wider success will depend on whether in the future another group of twelve botanists will be willing to spend nearly 800 hours re-recording the Forest in their footsteps. The filing cabinets of botanists and zoologists are full of baseline surveys that have never been and never will be repeated, but in this case the conservation importance of the area, its small size and the quality of this baseline survey may increase the chances of a repeat. The authors' wider success will also depend on how many botanists in other areas are convinced and take up the challenge. I personally am convinced by the idea, but I am sceptical about how practicable the methods are in other situations. For example, Ashdown Forest is mostly open access, and the authors say that there was lower coverage around the margins of the Forest where the access is not open (they even lamely mention under *Lolium perenne* one square "where it must occur but we have not had access to the farm land"). Over much of the British Isles *most* of the land is private farm land, and repeat visits by different botanists and at different seasons are often quite out of the question. Furthermore, few of us have enough recorders and time at our disposal to hope ever to be able to reach the level, claimed in this Flora, at which the maps reflect the real distributions of the plants without any significant distortion caused by variation in the recording effort. A few authors may be able to write as

interesting a Flora as this, but unless they adopt similar criteria the results will not be as accurate and will certainly not be as meaningfully repeatable. Perhaps local Flora workers should channel their efforts into more cooperative recording schemes in fewer, smaller areas? The whole matter should become the subject of extensive debate within the B.S.B.I., as the case for rethinking our recording methods has now been presented to us so persuasively both in theory and in practice.

A. O. Chater

The Flora of Montgomeryshire. Edited by I. Trueman, A. Morton & M. Wainwright. Pp. xii + 244. The Montgomeryshire Field Society and The Montgomeryshire Wildlife Trust, Welshpool. 1995. Price £20.00. ISBN 0–9526715–0–6.

At the beginning of 1993, no Welsh vice-county had a modern County Flora: just two years later four have been published. The latest, *The Flora of Montgomeryshire*, like two of the others (Flintshire and Radnorshire), covers a county that has previously had no more than incomplete lists published.

The Flora of Montgomeryshire has been prepared by much the same team responsible for the *Ecological Flora of the Shropshire region* (1985), and shares much of the excellence of that Flora. Only vascular plants are included although lower plants are sometimes mentioned in passing. The introductory chapters, covering such diverse topics as history, physical features and land cover, climate, geology, soils, land use, vegetation and conservation, form "The Background" and occupy the first third of the book. They provide a fascinating and detailed account of the county and are ideal for an occasional read while curled up in an armchair if you don't have the stamina to go through them all in one go! Having a particular enthusiasm for historical botany I enjoyed in this way the chapter on the history of botanical recording in Montgomeryshire: a very erudite account full of interesting detail and well worth dipping into even if a bit technical and heavy going in parts.

A splash of colour is provided by nine colour plates. The first shows members of the Flora team in 1989, three are of satellite images of varying magnification, four of plants from various habitats, and the last of a county speciality, *Lychnis viscaria*. These last five plates are exquisitely drawn but it is a shame that the opportunity was not taken to include a key to the plants depicted on the first four, especially as there is plenty of space above each caption and such a key was included for members of the Flora team.

The second part of the book, "The Flora", contains three chapters and in the first of these, "Survey and Computing Methods", we come across one of the few aspects of the Flora that I find disappointing. The vascular plant taxa are divided into three groups depending on rarity: the very common 'A' species (184), the rare 'C' species (500+) and the intermediate 'B' species (452). The B and C taxa are either mapped by tetrads or have localities (with 10-km square references) listed, but for the A species, although we are told that they are common and widespread, they are not mapped and nor are lists given for the 10-km squares in which they are absent. Surely this latter would not have been too much to ask nor would it have taken up that much extra space. I do feel it a shame that at least the 10-km square distribution is not given for all taxa found in the county and treated in the Flora. It should also be noted that the distribution presented here of the B and C species is a snapshot of the flora from 1985 to 1991 rather than a full treatment. We are told that "earlier records have generally been omitted, except where they are thought to be particularly interesting". These moans apart, there is much to interest and excite. For each taxon a Latin, English and Welsh name is given together with an occasional Latin or English synonym. The details of habitat and distribution are well set out and are often supplemented by interesting comments. The large (A4) size of the book permits the use of three columns of text in this section and allows the distribution maps to be interspersed with the text. This arrangement is much to be preferred to having the maps in one block at the end of the text. When looking at the distribution of a species it is often desirable to consult a larger scale map of the county and the provision of a reprint of the 1:250,000 Ordnance Survey map on the front and back end covers facilitates this. A useful transparent overlay gives eleven maps which provide various details of topography, geology and climate.

The concluding chapter, on analysis and interpretation of plant distribution data, presents much

interesting information. I find it difficult to get to grips with the mechanics of computer analysis, but it is comforting to see the close correlation between the different methods used here to produce distribution maps of various habitats. Contrary to some botanists, I do find satellite imagery helpful in interpreting land use, and it is good to note that the information from land cover maps derived from satellite imagery also gives close correlation with the other methods.

Two indexes are given, one to places and physical features mentioned in the text and the other a comprehensive index to Latin and English plant names found throughout the book. The omission of Welsh names from this index is probably for the best as their inclusion would have added considerably to its length and not added much to its usefulness.

It is a tribute to the proof-reading that misprints are remarkably few. On p. 28 figures 2 to 5 are wrongly numbered 3 to 6 in the text; some words have been put in the wrong font and the final authority for *Pseudorchis albida* is missing on page 200.

The Flora of Montgomeryshire provides an excellent account of the vascular plant flora of this previously little-known part of the British Isles and the whole Flora team are to be congratulated on producing such a fine work at an attractive price.

R. G. Ellis

Die Sommerwurzarten Europas. H. Uhlich, J. Pusch & K.-J. Barthel. Pp. 235. Westarp Wissenschaften, Magdeburg. 1995. Price DM 46.00. ISBN 3–89432–444–9.

Rather like buses – nothing for a long time and then two come along together – this is the second book on European *Orobanche* (broomrapes) within twelve months. This one differs from its predecessor by Kreutz, reviewed in *Watsonia* **21**: 216–217 (1996), in several ways. In the German language throughout, it is an A5 paperback and lacks the lavish photographic illustrations of the other volume. Colour photographs are limited to just two composite plates, augmented by others in monochrome but of poor quality and consequently of little illustrative value. Line drawings of some of the plants purport to illustrate their habit and these, together with corolla drawings, are reminiscent of those in Beck's monographs and give the book a distinctly quaint, old-fashioned look.

Introductory chapters deal with the position of the genus within the Orobanchaceae followed by a description of the internal division of the genus itself. A description of broomrape ecology, sociology and anatomy follows after which a rather elaborate key precedes the main descriptive section of the book. Here individual taxa are treated under a series of headings which include synonyms, variants, morphological description, ecology, host-plant preference and geographical distribution. The main part of the book concludes with further information on broomrapes in Germany and thus reflects the special regional interest of the authors.

Despite its small size, this book gives surprisingly detailed information for many of the taxa described. The authors claim to have based most of their taxonomy upon the German regional *Exkursionsflora* of Rothmaler and colleagues. However, when treating such a genus on a wide European basis, this is perhaps a rather dangerous practice and there appears to be little new taxonomic input from the authors. Furthermore, a large proportion of the book's technical content, and especially its distributional data, is culled from relatively old literature sources whose conclusions are in many cases in urgent need of revision. Granted, this is a difficult genus and one which, when tackled on a European scale, will require many years of work and first-hand experience of the living plants for progress to be ensured. The inaccuracy of distributional information is especially worrying and reinforces the view that this should always be based upon reliably identified voucher specimens, otherwise errors will only be further perpetuated. Checking details for two Austrian localities where I saw good colonies of *Orobanche caesia* last year, the authors record it as extinct since 1946 at one (Eichkogel) and consider it to be probably also lost at the other (Haglersberg). Further delving revealed many similar instances whilst, conversely, some taxa are recorded for countries from which they are unknown.

At the end of the book over 800 recorded host-plants are listed. This information should be

treated with especial caution, since actual attachment between parasite and host is often assumed rather than confirmed in the field. Given the above reservations, the book gives a useful summary of the genus in Europe but may be of limited practical use in the field.

M. J. Y. Foley

An illustrated Flora of North Cyprus, Vol. 2, *Sedges, grasses and ferns*. D. E. Viney. Pp. xv + 167. A. R. G. Gantner, Vaduz, Liechtenstein. Price not stated. ISBN 3–904144–04–9.

In 1994, Dr Viney brought out a volume on the flowering plants of the Turkish part of Cyprus. This little volume, covering sedges, grasses and ferns, completes his account of this area.

The book, like Stace's *New Flora of the British Isles* (1991), has a home-produced feel. As far as the sedges and ferns are concerned it will be useful for Cyprus (although it is possible that the user will encounter plants which occur only in the south of the island and which are therefore not covered) but probably not much use further afield. Only 21 members of the Cyperaceae and 13 ferns are included, although these are all illustrated and any drawings of these plants are welcome.

It is the grasses that form the bulk of the book. Dr Viney provides a key to genera, adapted from Bor's marvellous account of the grasses in the *Flora of Iraq* (1968). This is illustrated by little drawings (which could be clearer) and uses terminology that, in trying to be simple, is not always precise, as in the use of the word "spray" to describe a raceme. But in the species accounts which follow, where the drawings are used in conjunction with text on the opposite page, the overall result is very useful indeed and is a helpful contribution to the understanding of the commoner grasses of the eastern Mediterranean area. There are 130 species described, and the illustrations include many extra details of individual characters. We would have liked to try the key to *Aegilops*, where ten species and varieties are covered in a totally different form from that in other Floras we have seen. We are reminded of Bor's comment that "determinations by amateurs or those with limited experience will be at the best good guesses, and at the worst wildly wrong". Yet we keep trying!

A small supplement to the first volume is included, and a few amendments to that volume. There are quite a few small errors of various sorts in this volume, but it would be nit-picking to detail them. On balance the book is an excellent attempt to illustrate and describe groups of plants which are almost totally ignored by every other popular Mediterranean Flora, and it is especially valuable for those who intend to visit the under-recorded eastern end of Cyprus.

A. J. Byfield & D. A. Pearman

An Irish Flora, 7th ed. D. A. Webb, J. Parnell & D. Doogue, with drawings by H. Nixon. Pp. xxiv + 337. Dundalgan Press (W. Tempest) Ltd, Dundalk. 1996. Price IR£14.99. ISBN 0–85221–131–7.

David Webb's *Irish Flora* first appeared in 1943 (at a time when botanists in Great Britain had no comparable reference). This new edition, hardback like its predecessors, is the first since 1977 and the first to be published after the death of its well-known author, with co-authors John Parnell and Declan Doogue guiding it through the final stages of publication.

The new edition contains, we are told, 1,341 species and hybrids – probably a considerable increase over the last edition, although the precise figure for the 6th edition is not readily available. It is evident, however, by the increase from 277 to 337 pages of main text and indexes. The page size, 185 × 125 mm, is also slightly larger, but not so as to render the book unsuitable for accommodation in the average jacket pocket – one of the most useful features of this Flora.

One striking change from the 1977 edition is the excellent new illustrations scattered at suitable places through the text to illustrate key diagnostic features. These are by Holly Nixon and have a boldness and clarity which must surely assist identification – see for example the contrasting appearance of the fruits of the two *Agrimonia* species or the inflorescences of *Salicornia* species.

The overall format and appearance of the work remains as in previous editions, which over the past half century has proven itself as a workable system of keys and descriptions. A brief

explanation for beginners explaining how to use the keys and based on identifying a foxglove is included in the chapter "How to use this book" which guides the user through the stages until the family name is reached. Rather unhelpfully, one of the key stages (flowers regular/irregular – a potentially difficult dichotomy for many beginners) is omitted.

Substantial portions of the text seem to be completely new and the treatment of many genera has been expanded – notably *Sorbus*, *Rosa*, *Acaena*, *Carex* and several of the pteridophytes. Perhaps the most obvious re-write has been the conifers, which now includes some excellent illustrations of cones and treats most of the commonly planted species with full descriptions and keys, although the complete omission of the very frequently encountered *Pinus nigra* seems a little odd.

Critical groups like *Taraxacum*, *Hieracium* and *Rubus* are not dealt with beyond species groups, but this is fully consistent with the aims of the book and the requirements of most of its users.

Other new features are a glossary of the meaning of Latin names and new illustrations to accompany the glossary of technical terms – this itself being a valuable mini-dictionary of botanical terminology. Altogether a much improved version of an old favourite, perhaps a little expensive at IR£14.99, but with no competition as a handy pocket guide.

P. Hackney

Obituaries

HERMANN-HEINO HEINE
(1923—1996)

Dr Heino Heine died at his home in Mannheim, Germany, suddenly on 22 January 1996. He was a familiar figure at B.S.B.I. Exhibition Meetings, which he attended regularly, having been a member of the Society since 1958. His encyclopedic knowledge of botanical taxonomy and botanical history and literature, not to mention cultivated plants, fine arts and history in general, was put at the disposal of many B.S.B.I. members when he was at Kew and, subsequently, when he worked in Paris at the Musée National d'Histoire Naturelle.

Heino Heine was born in Mannheim on 14 April 1923. He followed his father into medicine, but his studies at Heidelburg University were interrupted by service in the Wehrmacht Medical Corps during the latter stages of the 1939–1945 war. Having eventually qualified as Dr med. in 1948 (his thesis was on the medical application of some Solanaceous drugs), he turned to his preferred interest, botany, and acquired another doctorate, Dr rer. nat., at the University of Munich in 1953. He was then employed by the Botanische Staatsammlung in Munich to work on the *Prodromus einer Flora von Südwestafrika*, in a team that included another botanist who was subsequently to become familiar to B.S.B.I. members, Edmund Launert.

Heino's next move, in 1958, was to Kew, where he worked with Nigel Hepper on the second edition of Hutchinson & Dalziel's *Flora of West Tropical Africa*. He contributed accounts of seven gamopetalous families, including Sapotaceae, Solanaceae and Acanthaceae. His stay in England, however, was relatively brief, as he resigned his post in 1961 and departed for Paris to become a Maître de Recherches in the Laboratoire de Phanérogamie of the Musée National d'Histoire Naturelle. There he was to contribute accounts of some of the same and related gamopetalous families to the *Flore du Gabon* and the *Flore de la Nouvelle-Calédonie*, as well as to write on the history of botany and on cultivated and adventive plants. After retiring in 1988, he returned to Mannheim, where he 'camped' on his own in the rather substantial family home, his father having gone to live with Heino's sister and her husband in Freiburg. Heino did little or no further research, but occupied himself mainly with botanical and horticultural conferences, committees and tours. He became a member of the Scientific Committee of the Royal Horticultural Society and travelled to London regularly for its meetings, for the B.S.B.I. Exhibition Meetings and for Council Meetings of the International Dendrological Society that were held there.

Heino Heine travelled to Australia and New Caledonia in connection with his work in Paris, as well as to various parts of Europe, but most of his later journeys were made on tours of the International Dendrological Society (I.D.S.). With them he visited Sri Lanka, New Zealand, China, Japan, the U.S.A., Belize, Chile, Dominica and some countries nearer home; and he contributed accounts of six of these tours to the Society's *Year Book*. Despite his wide knowledge, Heino published relatively little. Apart from his contributions to Floras and these accounts of I.D.S. expeditions, his publications amounted to some 40 papers (all except his two theses relatively brief); but he will be remembered more for the help that he gave to other people than for these. He was always willing to put his encyclopedic knowledge at the disposal of his friends and acquaintances, many of whom were in the British Isles. Several, for example, have had memorable experiences of historic, artistic, architectural and gastronomic Paris in his company. Although Heino had an extensive knowledge of and respect for French culture, food and wine, he developed a greater love of the British Isles and their institutions. Most of his friends were there, and he liked nothing better than to visit them or to entertain them, perhaps to dinner at the Athenaeum, of which he was a member in his later years. During his working life he never had his own home: throughout his 27 years in Paris, he lived in the hotel room which he had originally booked as a temporary base from which to hunt for permanent accommodation. In this and other ways his behaviour was sometimes unexpected, even eccentric; but it was all part of an unforgettable warm and generous character who will be greatly missed.

For help in writing this obituary, I am greatly indebted to David McClintock and Heino's sister Dr Gudrun Prier, and indirectly to the late Edgar Milne-Redhead, and to Nigel Hepper, Dr Edmund Launert, Dr Adelaide Stork, and Professor G. G. Aymonin.

N. K. B. Robson

FRANCES LE SUEUR
(1919—1995)

With Frances Le Sueur's death Jersey has lost its foremost botanist and a leading force in the field of conservation in the island. Frances joined the B.S.B.I. in 1955, becoming recorder for Jersey in 1982. She was also for some years a member of the Wild Flower Society.

Frances Adams Ross was born in Carlisle, Cumberland, on 6 August 1919. She won a scholarship to the Carlisle and County High School for Girls and later read mathematics at Manchester University, where she was also captain of hockey and tennis. In 1948 Frances came to Jersey to teach mathematics at the Jersey College for Girls, later becoming head of department.

Frances's interest in natural history began with bird watching on the Solway near her home and was developed further when she joined the Société Jersiaise, the local society for natural historians, very soon becoming a prominent member of the newly reformed Ornithology Section. It was there too that she met Dick Le Sueur, a local architect, whom she married in 1952. For some years Frances was Channel Islands Representative for the British Trust for Ornithology and, in 1973, published a paper in *Bird study* on Cetti's Warblers nesting in Jersey, their first recorded breeding in the British Isles.

Although birds were her first love, Frances also had an interest in flowers and the many hours spent at the Jersey Bird Observatory adjoining the site of one of the island's special plants, *Orchis laxiflora* (Loose-flowered Orchid), stimulated her to learn more about them. With the same dedication she had shown towards birds Frances, with the writer, set about studying the plants of the island, a task helped considerably by the newly-published "Clapham, Tutin & Warburg" which, unlike earlier Floras, included Channel Islands specialities. It was fortunate for botany in Jersey that Mr T. W. Attenborough, a senior pharmacist, was still active. Mr Attenborough had been almost the only knowledgeable field botanist in the island for many years and he was not only able to help with identification but, more importantly, with detailed information about past and present localities of species. Although not a collector, or even a recorder, he had an excellent memory and had met a number of local botanists in his long life. Frances recognised the importance of his knowledge and devoted considerable time and effort to recording it. In 1953 she relaunched the Botany Section of the Société, dormant since before the war and, with a group of keen members, started mapping plant distribution for the 1962 *Atlas of the British flora*. Her enthusiasm and application were rewarded by the record number of plants listed for the Jersey "square". Inspired by this Frances organised a local mapping scheme, the results of which appear in her *Flora of Jersey* and which have already become a baseline for comparison, now and in the future.

A natural history of Jersey, Frances's first book, was published in 1976 and she had hoped to follow it with a Flora but she soon became aware of many anomalies and inconsistencies in the substantial herbarium of Frère Louis-Arsène, which belonged to the Société. Frances felt it essential, both for accuracy, and for the sake of past and future botanists, to investigate these problems and she undertook the necessarily long and wearisome study with her customary thoroughness, the resulting paper, a brilliant piece of research and deduction, appearing in *Watsonia* (**14**: 167–176, 1982). The way was then clear for the *Flora of Jersey*, which was eventually published in 1985, the first book on the island's plants since 1903. As well as containing maps for any species occurring in five or more localities it included every wild plant known to have been found in Jersey. Old records were evaluated where possible, and Frances visited or had records checked at all possible mainland herbaria. The book, which includes 18 specially commissioned paintings by Pandora Sellars, is essential reading for anyone interested in plants in Jersey or the history of its flora. For this, and in recognition of her contribution to natural history in Jersey, including more than 30 years as Chairman of the Botany Section, the Société nominated her a Membre d'Honneur, an award not given lightly.

Always quick to acknowledge the help she received from visiting botanists, Frances gave hospitality to a number of them: Mrs Jocelyn Russell, Ted Lousley and David McClintock were among the regular guests whose assistance is acknowledged in the *Flora*. The participants in the B.S.B.I. spring excursion to Jersey in May 1986 will remember Frances welcoming them to her home and the careful arrangements she made to ensure the success of the trip. Local and visiting naturalists were all made to feel at home at Les Hâtivieaux and Frances was always delighted to assist any botanists or students who came to the island and to give generously of her time to show them Jersey's plants. It gave her particular pleasure, when she and Dick moved house to St Ouen, to discover a thriving colony of *Ranunculus paludosus* (Jersey Buttercup) growing on their own property.

It was one of Frances's tenets that widening the public's awareness of the island's natural history was an important step towards encouraging its conservation and she gave innumerable talks on plants, accompanied by her own high quality photographic slides, to local societies and organisations and also to visiting parties. She led courses on botany at the local further education college and contributed a regular natural history column, to the daily local newspaper. When a meadow full of *Orchis laxiflora* and other orchids was purchased by the National Trust for Jersey, Frances was quick to suggest that it should be opened to the public and a path cut through the area so that the orchids could be seen at close range.

Frances's interest in flowers was not confined to Jersey and, with Dick and their sons, she made frequent visits to Europe; she joined the BSBI excursion to Bulgaria in 1988, and later, travelling farther afield she particularly enjoyed two holidays looking at Tibetan flowers when her younger son was working in Lhasa. She also collaborated on scholarly plant lists for Alderney, Sark and Herm published in the *Reports and transactions of La Société Guernesiaise*. Frances's enthusiasm for plants extended to their cultivation and she was leader of a small group studying the history of gardens in Jersey.

Conservation was a new concept in Jersey in the late 1960s but Frances quickly became aware of the threats which a rapidly growing population and the expansion of building development posed to the remaining open areas of the island. Over the next 20 years she worked tirelessly, through the local press, television and radio, to promote the cause of conservation. In 1970, with two like-minded naturalists, she was instrumental in persuading the States of Jersey to set up the Nature Conservation Advisory Body, whose purpose was to provide authoritative advice to the Planning Department on all aspects of natural history, to aid its decision-making. Frances saw that accurate information made available at an early stage was preferable to protests when projects were already well advanced. However, confrontation was not always avoided and her unwavering stance in the face of official intransigence was widely admired. She made an outstanding contribution to the study and conservation of wildlife in her adopted island as has been acknowledged by the States' naming their new interpretation and study building in the St Ouen's Bay Conservation Area, the Frances Le Sueur Centre.

Characteristically, Frances made light of her illness, continuing as far as possible with her normal life until a few weeks before her death on 17 May 1995.

MARGARET L. LONG

PAUL WESTMACOTT RICHARDS C.B.E.
(1908—1995)

With the death of Paul Richards, the world of botany has lost one of its most distinguished figures. His passion for plants began in early boyhood and he published his first paper while still at school. This youthful interest was encouraged by leading botanists of the time – Arthur Wade, Eleanor Vachell, Claridge Druce, D. A. Jones and W. R. Sherrin. He paid special tribute to the influence of Druce, who enrolled him in the Botanical Exchange Club as "our youngest member". After schooling in London and Cardiff, he won a Trinity College scholarship to Cambridge, graduated with first class honours in Botany and stayed to become a Research Fellow of Trinity, and then university lecturer in the Botany Department. In 1949, he was appointed to the Chair of Botany in the University College of North Wales in Bangor, where he remained until retirement in 1976.

Through the fortunate chance of joining a 1929 expedition to Guyana, Paul Richards fell in love

with the tropical rain forests while still a student. He was drawn back repeatedly to these magic places, the richest wildlife habitats on Earth, in Sarawak, Borneo, New Guinea, Malaysia, Nigeria, Cameroon, Costa Rica, Amazonia and elsewhere. In 1952 he published his greatest achievement, his classic treatise on *The tropical rain forest*, which had several reprintings and translations, and established him as the foremost authority on the subject. Paul continued to develop his knowledge of these complex habitats, and during his last years completely revised his book though, sadly, publication was not until after his death. With so much concern about the fate of tropical rainforests worldwide, this second edition is most timely.

Although Paul specialised also in the study of mosses and liverworts, and became a leading bryologist, he was an all-rounder who knew his vascular flora extremely well. He belonged to a time when university botany was still essentially about knowledge of whole plants, and perspectives were wider than the confines of the cell-wall. Through numerous field excursions he introduced students to the marvellously varied flora of North Wales, and with research students promoted the ecological study of the major habitats and plant communities of the region. My own introduction to the Snowdonian mountain flora was on a pouring wet day in Cwm Idwal, where the Professor discoursed learnedly on the choice plants of those wonderful cliffs, with the water dripping from his sou'wester. He had a special interest in the Juncaceae, and contributed the accounts of these to the Clapham, Tutin & Warburg *Flora*, and to the *Biological Flora of the British Isles*. Among the subjects of autecological studies he undertook with his research assistants were *Hymenophyllum wilsonii*, *H. tunbrigense*, *Saxifraga oppositifolia* and *Silene acaulis*; accounts of these, and the rushes, duly being published also in the *Biological Flora of the British Isles*.

Paul inevitably became concerned with the survival of the plants and places that so fascinated him, and he played an active and important role in the post-war development of nature conservation. After advising on policy, he became a Member of the new Nature Conservancy in 1954, and Chairman of its Committee for Wales from 1956–67, helping to promote an energetic programme of nature reserve acquisition and special site protection. He was also a Member of the National Parks Commission, 1955–59, and helped to found the North Wales Naturalists' Trust, becoming its Chairman from 1969 to 1972. And he became a passionate defender of his beloved rain forests, now in the front-line of human onslaught.

Always an internationalist, Paul Richards was much in demand as a visiting lecturer and scholar in botanical establishments the world over. He was a member of the committee of the U.S. National Academy of Sciences which investigated effects of war-time defoliants in Vietnam. His work was honoured in many ways: including Presidency of the British Ecological and British Bryological Societies, and Honorary Membership of both; the Bullard Fellowship of Harvard University; the Linnean Medal for Botany; and the C.B.E.

Yet Paul retained an essential modesty and naturalness, and a dedication to the pursuit of knowledge. He followed in the tradition of the intrepid early naturalist explorers of the tropical jungles, such as Richard Spruce and Russel Wallace, but with a modern approach. He was never happier than when in the field, whether measuring the great trees of the luxuriant forests or examining some rare arctic-alpine in the rugged mountains of Snowdonia. His students and companions could marvel at his quiet erudition, leavened with flashes of wry humour and amusing anecdote, as he held forth on features of interest. A lovable figure, his appearance of slight, almost frail, physique, and of perennial youth, were belied by an actual indestructibility and wise maturity of view. Paul owed much to the devoted support of his wife, Anne, and generations of Bangorians will remember with affection the warm hospitality they received at the Richards' home. Besides Anne, he leaves children Kate, Martin, Mary and Sarah.

D. A. Ratcliffe

VIOLET VERE CHARLOTTE SCHWERDT M.B.E.
(1900—1996)

Violet Schwerdt was a lovely lady in every sense, carrying on until she was 94 the traditions started by her mother in the 1890s, a unique family record stretching well over 100 years. For her mother, Mrs E. V. Dent O.B.E. (1863–1948), started in the mid 1880s what soon became The Wild Flower

Society. When she died, Violet's younger sister, Hilda (1903–1956) took over the running of the Society, but when she, sadly, died, the duties fell to Violet.

In one way or another, running the Society was in her veins and she had had her part in this from early years. After her marriage in 1928 to Capt. C. M. R. Schwerdt R. N., there were travels to Newfoundland and Nova Scotia, and postings prolonged by the war to 1945; the family then settled at Esher, Surrey. When Violet was widowed in 1968, she moved to Horsmonden, Kent, near where her younger daughter, Pamela, was in charge of the National Trust Garden at Sissinghurst, Kent.

Violet's Presidency of the Wild Flower Society covered no fewer than 28 years. During the earlier part she ran the Society single-handed, being Secretary dealing with plans of all sorts, including choosing Secretaries for the Branches, also being Treasurer and Editor and packing and sending out the Magazines three times a year. Eventually, in the 1970s, she began to shed some of the load. But she remained much more than the hereditary figurehead, controlling policy with quiet innate wisdom and coping with financial and lesser crises. At one time there was not enough money to pay for the next Magazine – now the Society's assets total £14,000. There were 552 members when she took over and by 1980 there were 950. Many of these had joined the W.F.S. as wild flower lovers, and through their diary recording system they became keen amateur botanists. A number of these W.F.S. members then joined B.S.B.I., of which Mrs Schwerdt was elected an Honorary Member.

Violet Schwerdt was a keen plantswoman and to the end of her life she loved finding new wild flowers. Her two daughters, Pamela and Rosemary were her greatest support. There are much fuller and fascinating accounts of this memorable and loved lady in the *Wild flower magazine* notably in Summer 1980, Autumn 1986 and Autumn 1996.

D. McClintock

PHILIP JOHN OWEN TRIST O.B.E., B.A., M.R.A.C., F.L.S.
(1908—1996)

John Trist was born in Putney Bridge Road, London, on 22 April 1908, the son of a general practitioner who was descended from a Devon family with a tradition of farming. Soon after, his father moved to a practice at St Column Major in Cornwall, and there John spent his childhood. His father became an army surgeon in the First World War and was awarded the M.C., and his mother moved into Newquay until his return. His father then moved to a practice in Bristol, while John was having his major education at King's School, Taunton, in Somerset.

On completing his education at the age of eighteen he went to New Zealand to get three years' experience in farming, under a scheme in which public school boys were to help progress in that country. They were the hardest years of his life, spent on very primitive sheep farms where it was all hard work and no intellectual company. He said in later years having surviving that, he never found anything so difficult to cope with again. He was able, however, to say he had been round the world by the time he was 21, going out via Suez and coming back by Panama.

On his return he attended the Royal Agricultural College at Cirencester, where he graduated M.R.A.C. in 1932, followed by a B.A. in economics at the University of Bristol. He then spent two years farming in Herefordshire.

At the start of the Second World War he had a short spell in the Royal Artillery, but because of his knowledge of farming he was transferred to the Essex War Agricultural Executive Committee as the District Officer for the Maldon area of Essex. He also became a lecturer at the Essex College at Writtle. He was promoted to County Agricultural Officer for East Suffolk in 1946 and later became County Agricultural Officer for Suffolk in the National Agricultural Advisory Service under the Ministry of Agriculture, Fisheries and Food until his retirement in 1971.

During the War years he had as many as 4,000 prisoners of war working on the land under his jurisdiction and he did all he could to help the farmer on the poorer land. The great moments of his life in farming, however, were when he planned the recovery of agricultural land in Suffolk after the major coastal floods on 31 January 1953. For this service he received an O.B.E. It was studying the plants, particularly the grasses, which invaded the flooded land which first turned him into a botanist. His book *Land reclamation,* published in 1948, was a record of the civilian agricultural war effort.

He was invited by the Royal Agricultural Society of England to write *A survey of the agriculture of Suffolk*. Published in 1971, it was a labour of love, and ran to 366 pages. It discussed geology and soils, size of holdings, grassland, different types of farming on boulder clay, fen, coast and sand, pigs, sheep, horses and poultry and equipment. Much of it is important knowledge for the field botanist.

For the first five years of his retirement he became the first Conservation Officer for the Suffolk Trust for Nature Conservation, now the Wildlife Trust. As well as obtaining many new reserves he wrote the first guide to them.

I first met John when he came into the Cambridge herbarium with Frank Perring when editing *An ecological Flora of Breckland* (1979), and we became friends for the rest of his life. This book caused him much trouble as the information given him was inadequate and he had to do much extra fieldwork himself.

When he finished his spell as Conservation Officer he spent much time with Marg Rutterford wardening the Breckland reserves, so he was well qualified to deal with the Breckland flora. These years with Marg he said were some of the happiest years of his life, and he sadly missed him when he died in 1991.

John's speciality had become grasses and he got together one of the finest collections of British native grasses ever made. For many years he was a referee of British grasses for the B.S.B.I., and between 1981 and 1992 he determined 1891 specimens. For this work he was made an Honorary Member of the Society. He corresponded with all the main British herbaria and also Ottawa, Copenhagen, Tromsø, Trondheim, Leiden, Thessalonika, Kosice and Kraków.

The number of his published works was large. He and his son were making a list of them just before his death. With papers, books, reviews and obituaries they listed 131 items.

I have always thought that one of the most important features of my life as a botanist was that I grew up on a farm and became intimate with all aspects of farming life and how it affects the landscape and natural history of the countryside. John was one of the very few botanists I have been with in the field with whom I felt I had a rapport on the sensible attitude to be adopted between farmer and naturalist. He seemed to know all the Suffolk farmers and used these friendships to help protect the reserves. The most memorable day I ever spent with him was when he took me to see all the Suffolk Fritillary meadows. It was a glorious May day, all the plants were at their very best, and John gave me the history of each meadow. Calling on the farmers first to exchange greetings, we were left to enjoy their beauty in perfect peace. My last outing with him was to the shingle between Thorpeness and Aldeburgh, on to which John struggled with two walking sticks to see *Poa bulbosa* (Bulbous Meadow-grass).

The collection of British grasses in the University Herbarium at Cambridge (**CGE**) stands as a permanent memorial to his work on that family. He meticulously examined and determined all 9000 or so specimens in the collection. To it has been added his own personal collection of over 3000 sheets, left to us in his will. His specimens, from all parts of the British Isles, are carefully selected, meticulously labelled with habitat and locality and annotated with numerous notes. This British and Irish collection in the Cambridge herbarium is now arranged to follow the account of Poaceae in Peter Sell & Gina Murrell, *Flora of Great Britain and Ireland*. John's last major contribution to British and Irish botany was to read through, correct and annotate this account, adding much from his card index of notes made over many years.

However common the species, John always looked carefully at a grass with a lens and often measured the flower parts before naming it. I walked into John's house one day with a handful of tall grasses for him. "Why have you brought me *Arrhenatherum*" he said. "No! You would not do that". Picking up a lens and examining it he said "It's a *Trisetum* but I have never seen one looking like this". After submitting it to a thorough examination he confirmed my opinion that the grass sown all over the Gog-Magog Trust land near Stapleford is *Trisetum flavescens* subsp. *purpureum* (Yellow Oat-grass).

John left me his working copy of Charles Hubbard's book, *Grasses*, which is heavily annotated. Hubbard was his mentor, or as John called him his guru. There is a touching remembrance to Hubbard written in the front of this book in John's hand: "Charles Edward Hubbard, 1900–1980. His ashes were buried in a family grave at West Newton, near Sandringham at 4.0 pm Friday 18 July 1980. John [Hubbard's son] and his family asked me to join them. I laid 86 species of grass on the casket."

John had had so many operations that he almost took them for granted and when his artificial hip began to crumble, he did not hesitate to ask his surgeon for another operation even though he was 88 years of age. His last botanical act before going into hospital was to press a specimen of *Poa bulbosa* which he had brought back from Thorpeness and grown in his garden. Alas, complications set in after his operation and he died on 10 June 1996.

A cross-section of people from many walks of life attended his funeral and internment in Balsham churchyard. John's favourite county was his beloved Suffolk, a view with which I heartily concur, but in his last years he gave much time to the checking of Cambridgeshire grasses. John Trist was a kind and gentle man and will be much missed by his family and his many friends. He leaves a widow, Philomena, and a son and three daughters from his first marriage.

P. D. Sell

MAJOR PUBLICATIONS

The following list contains all the major publications by P. J. O. Trist on botany and a few on agriculture which seem relevant botanically.

Salt tolerant flora on the Suffolk marshes. *Transactions of the Suffolk Naturalists' Society* **8**: 147–148 (1953).
Blythburgh Marshes. *Transactions of the Suffolk Naturalists' Society* **9**: 36–37 (1954).
Sandcovert Marshes, Blythburgh. *Transactions of the Suffolk Naturalists' Society* **9**: 259–261 (1955).
A frequent alien: *Amsinckia intermedia*. *Transactions of the Suffolk Naturalists' Society* **10**: 74 (1956).
Sandpit Covert Marshes, Blythburgh. *Transactions of the Suffolk Naturalists' Society* **11**: 68–70 (1958).
Protective flora of sea walls. *Journal of the Ministry of Agriculture* **67**: 228–231 (1960).
Vegetative proliferation of grasses and phyllody of clovers. *Transactions of the Suffolk Naturalists' Society* **11**: 307–310 (1960).
An ecological study of *Fritillaria meleagris* L. *Transactions of the Suffolk Naturalists' Society* **11**: 392–399 (1960).
Records of interesting grasses in Suffolk 1960–61. *Transactions of the Suffolk Naturalists' Society* **12**: 58 (1961).
The flora of an old pasture: habitat study. *Transactions of the Suffolk Naturalists' Society* **12**: 100 (1962).
Icklingham Plains: habitat study. *Transactions of the Suffolk Naturalists' Society* **12**: 199 (1962).
Avena fatua L. and other Gramineae records for Suffolk. *Transactions of the Suffolk Naturalists' Society* **12**: 345–346 (1964).
The flora of a manorial pasture. *Transactions of the Suffolk Naturalists' Society* **13**: 288–289 (1967).
Records of some grasses in Suffolk, 1968. *Transactions of the Suffolk Naturalists' Society* **14**: 220–221 (1968).
The changing pattern of agriculture, in F. H. Perring (ed.) The flora of a changing Britain 45–50 (1970). *B.S.B.I. Conference Report* **11**.
Festuca glauca Lam. and its variety *caesia* (Sm.) K. Richt. *Transactions of the Suffolk Naturalists' Society* **15**: 443–444 (1971).
A survey of the agriculture of Suffolk, pp. 1–366 (1971). Royal Agriculture Society of England County Agriculture Surveys No. 7. London.
Corynephorus canescens (L.) Beauv. – in West Suffolk. *Watsonia* **8**: 402 (1971).
Festuca glauca Lam. and its var. *caesia* (Sm.) K. Richt. *Watsonia* **9**: 257–262 (1973).
Narcissus 'Van Sion' at Monewden. *Transactions of the Suffolk Naturalists' Society* **16**: 230–231 (1974).
(with E. Milne-Redhead) A remarkable population of *Ophioglossum vulgatum* L. in Suffolk. *Watsonia* **10**: 415–416 (1975).
Festuca glauca auct. and *Festuca caesia* Sm. *Watsonia* **11**: 73–74 (1976).
Alopecurus bulbosus Gouan. *B.S.B.I. news* **19**: 22–23 (1978).
Fritillaria meleagris L. at Mickfield, Suffolk. *Transactions of the Suffolk Naturalists' Society* **17**: 332–334 (1978).
Tulipa sylvestris L. in Suffolk v.c. 25. *Transactions of the Suffolk Naturalists' Society* **18**: 82–83 (1979).
Some observations on *Catapodium rigidum* (L.) C. E. Hubbard subsp. *majus* (C. Presl) Perring & Sell. *Watsonia* **12**: 261–262 (1979).
Ed. *An ecological flora of Breckland*, pp. 1–105, maps 1–95 (1970). EP Publishing Ltd, Wakefield.
Corynephorus canescens (L.) Beauv. in W. Suffolk, v.c. 26. *Watsonia* **13**: 61–62 (1980).
Obituary of Charles Edward Hubbard (1900–1980). *Watsonia* **13**: 243–244 (1981).
Fritillaria meleagris L.: its survival and habitats in Suffolk, England. *Biological conservation* **20**: 5–14 (1981).
The survival of *Alopecurus bulbosus* Gouan in former sea-flooded marshes in East Suffolk. *Watsonia* **13**: 313–316 (1981).
Rex Graham Nature Reserve. *The Suffolk Trust for Nature Conservation* **11**: 1–12 (1982).

The past and present status of *Gastridium ventricosum* (Gouan) Schinz & Thell. as an arable colonist in Britain. *Watsonia* **14**: 257–261 (1983).

A reconsideration of the taxonomic status of *Poa balfourii* Parnell (Gramineae). *Watsonia* **16**: 37–42 (1986).

The distribution, ecology, history and status of *Gastridium ventricosum* (Gouan) Schinz & Thell. in the British Isles. *Watsonia* **16**: 43–54 (1986).

Festuca trachyphylla (Hackel) Krajina. *Nature in Cambridgeshire* **28**: 54–56 (1986).

Molinia caerulea (L.) Moench subsp. *arundinacea* (Schrank) H. Paul a subspecies of Purple Moor-grass. *Transactions of the Suffolk Naturalists' Society* **22**: 57–58 (1986).

Festuca trachyphylla (Hackel) Krajina, a grass introduced into the Suffolk Breckland. *Transactions of the Suffolk Naturalists Society* **22**: 59–61 (1986).

(with P. D. Sell) Two subspecies of *Molinia caerulea* (L.) Moench in the British Isles. *Watsonia* **17**: 153–157 (1988).

Identification keys to *Desmazeria rigida* and subsp. *majus*, *Molinia caerulea* subsp. *caerulea* and subsp. *altissima* and *Spartina anglica*, *maritima* and × *townsendii* in T. C. G. & M. D. B. Rich, *Plant crib* (1988). Botanical Society of the British Isles, London.

(with M. J. Wilkinson) *Alopecurus* × *plettkei* in Britain. *Watsonia* **17**: 301–308 (1988).

An introduction to *Bromus* spp. in Britain. *Wild flower magazine* 31–32 (Spring, 1989).

Spreading Meadow-grass, *Poa subcaerulea* Sm. *Nature in Cambridgeshire* **31**: 57–60 (1989).

The influence of farming practice on the survival and final extinction of *Veronica triphyllos* L. at Lakenheath v.c. 26. *Transactions of the Suffolk Naturalists' Society* **25**: 61–64 (1989).

Molinia caerulea var. *viridiflora* Lejeune: a variety of Purple Moor-grass in Suffolk. *Transactions of the Suffolk Naturalists' Society* **26**: 82–84 (1990).

Molinia caerulea subsp. *altissima* (Link) Domin. *Transactions of the Suffolk Naturalists' Society* **26**: 85 (1990).

Festuca arundinacea Schreb. var. *strictior* (Hack.) K. Richt. *Watsonia* **18**: 414–415 (1991).

Obituary of Margerson George Rutterford: 1907–1991. *Transactions of the Suffolk Naturalists' Society* **27**: 59–60 (1991).

Molinia caerulea (L.) Moench subsp. *arundinacea* (Schrank) K. Richter in Cambridgeshire v.c. 29. *Nature in Cambridgeshire* **34**: 61–63 (1992).

Corynephorus canescens (L.) Beauv. (Poaceae) on the west coast of Scotland. *Watsonia* **19**: 192–193 (1993).

Veronica triphyllos L. in Breckland v.c. 26. *Transactions of the Suffolk Naturalists' Society* **29**: 61 (1993).

Elytrigia repens (L.) Desv. ex Nevski subsp. *arenosa* (Spenner) A. Löve (Poaceae) in north-Western Europe. *Watsonia* **20**: 385–390 (1995).

Elytrigia repens (L.) Desv. ex Nevski subsp. *arenosa* (Spenner) A. Löve. *Transactions of the Suffolk Naturalists' Society* **31**: 54–56 (1995).

(with J. K. Butler) *Puccinellia distans* (Jacq.) Parl. subsp. *borealis* (O. Holmb.) W. E. Hughes (Poaceae) in mainland Scotland and the Outer Isles. *Watsonia* **20**: 391–396 (1995).

The incidence of *Lolium* × *boucheanum* Kunth in Cambridgeshire, v.c. 29. *Nature in Cambridgeshire* **37**: 41–42 (1995).

B.S.B.I. PUBLICATIONS

HANDBOOKS

Each handbook deals in depth with one or more difficult groups of British and Irish plants.

No. 1 SEDGES OF THE BRITISH ISLES
A. C. Jermy, A. O. Chater and R. W. David. 1982. 268 pages, with a line drawing and distribution map for every species. Paperback. ISBN 0 901158 05 4.

No. 2 UMBELLIFERS OF THE BRITISH ISLES
T. G. Tutin. 1980. 197 pages, with a line drawing for each species. Paperback. ISBN 0 901158 02 X. Reprinting.

No. 3 DOCKS AND KNOTWEEDS OF THE BRITISH ISLES
J. E. Lousley and D. H. Kent. 1981. 205 pages, with many line drawings of native and alien taxa. Paperback. ISBN 0 901158 04 6. Out of print: new edition in preparation.

No. 4 WILLOWS AND POPLARS OF GREAT BRITAIN AND IRELAND
R. D. Meikle. 1984. 198 pages, with 63 line drawings of all species, subspecies, varieties and hybrids. Paperback. ISBN 0 901158 07 0.

No. 5 CHAROPHYTES OF GREAT BRITAIN AND IRELAND
J. A. Moore. 1986. 144 pages, with line drawings of 39 species and 17 distribution maps. Paperback. ISBN 0 901158 16 X.

No. 6 CRUCIFERS OF GREAT BRITAIN AND IRELAND
T. C. G. Rich. 1991. 336 pages, with descriptions of 140 taxa, most illustrated with line drawings and 60 with distribution maps. Paperback. ISBN 0 901158 20 8.

No. 7 ROSES OF GREAT BRITAIN AND IRELAND
G. G. Graham and A. L. Primavesi. 1993. 208 pages, with descriptions and illustrations of 12 native and eight introduced species, and descriptions of 83 hybrids. Distribution maps are included of 31 selective species and hybrids. Paperback. ISBN 0 901158 22 4.

No. 8 PONDWEEDS OF GREAT BRITAIN AND IRELAND
C. D. Preston. 1995. 350 pages. Covers 21 species and 26 hybrids with many full page illustrations including habit and details of leaves, stems and stipules and up-to-date distription maps. Includes full descriptions, keys, and introduction with accounts of history, evolution and life histories. Paperback. ISBN 0 901158 24 0.

No. 9 DANDELIONS OF GREAT BRITAIN AND IRELAND
A. A. Dudman & A. J. Richards. 1997. 344 pages. 235 species described with silhouettes of herbarium specimens. 179 distribution maps. Paperback. ISBN 0 901158 25 9.

OTHER PUBLICATIONS

LIST OF VASCULAR PLANTS OF THE BRITISH ISLES
D. H. Kent, 1992. 400 pages. Nomenclature and sequence followed by Stace in *New Flora of the British Isles*. Paperback. ISBN 0 901158 21 6.

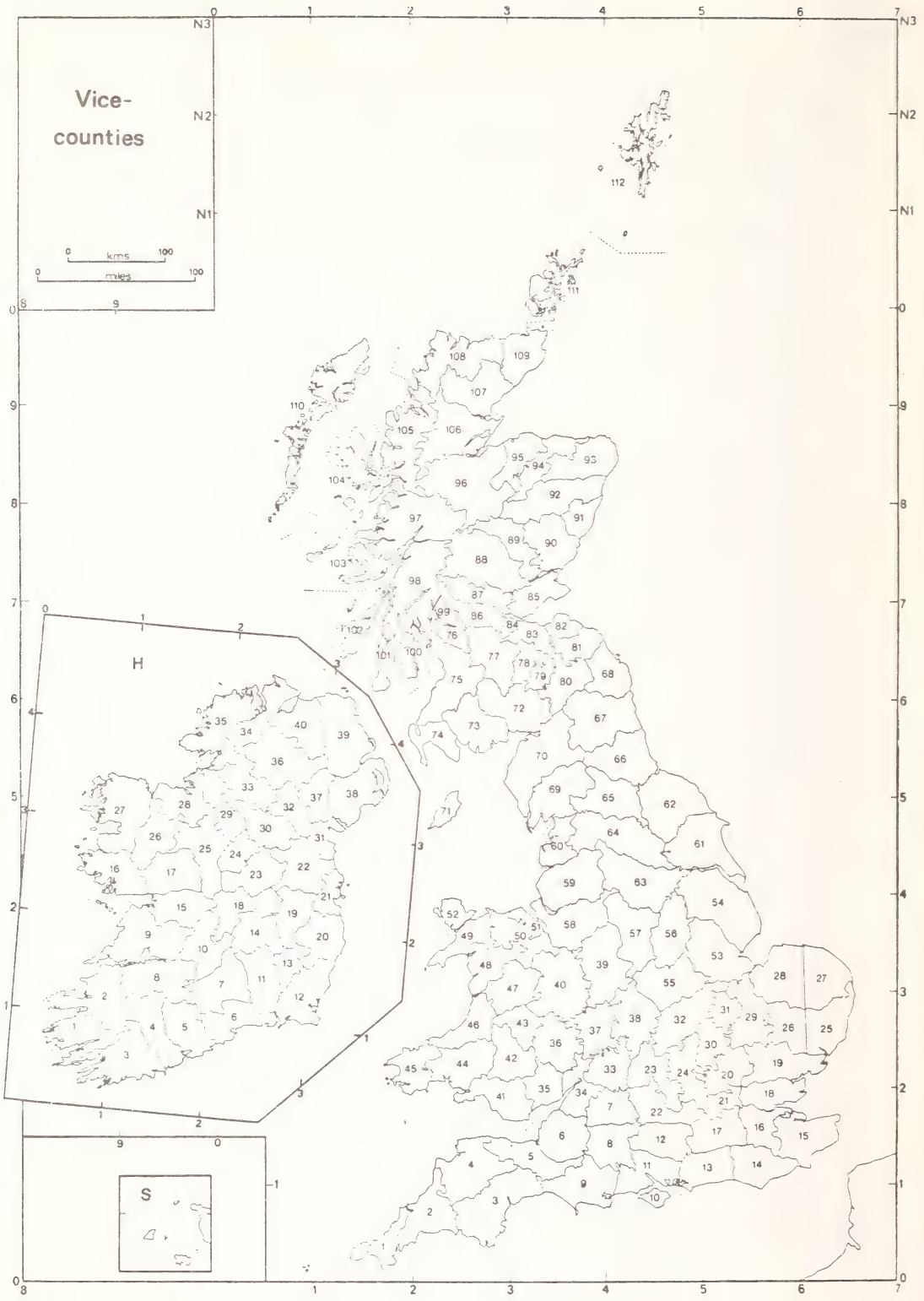
ATLAS OF THE BRITISH FLORA
F. H. Perring and S. M. Walters, 1990. Reprint of 3rd Edn, 1982. 468 pages. Distribution maps of over 1700 species including updated maps for 321 *Red Data Book* species. New bibliography of updated distribution maps published elsewhere since 1st Edn, 1962. Paperback. ISBN 0 901158 19 4.

ALIEN PLANTS OF THE BRITISH ISLES
E. J. Clement and M. C. Foster, 1994. 590 pages. Lists 3586 species found growing wild and includes frequency of occurrence, areas of origin, means of introduction, references to descriptions and illustrations and location of herbarium material. Excludes grasses. Paperback. ISBN 0 901158 23 2.

ALIEN GRASSES OF THE BRITISH ISLES
T. B. Ryves, E. J. Clement and M. C. Foster, 1996. 181 pages including 29 of line drawings by G. M. S. Easy. Lists 700 species. Format and contents as for *Alien plants*. Paperback. ISBN 0 901158 27 5.

ENGLISH NAMES OF WILD FLOWERS
J. G. Dony, S. L. Jury and F. H. Perring, 1986. 2nd Edn. 123 pages. A list recommended by the BSBI arranged alphabetically, Latin-English and English-Latin. Paperback. ISBN 0 901158 15 1.

Available from the official agents for B.S.B.I. Publications:
F. & M. Perring, Green Acre, Wood Lane, Oundle, Peterborough PE8 5TP, England.
Tel: 01832 273388 Fax: 01832 274568


Vice-
counties
0 kms 100
0 miles 100
H
S

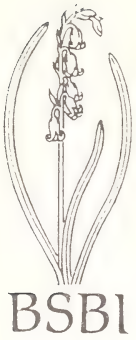
NAMES OF VICE-COUNTIES IN *WATSONIA*

ENGLAND, WALES AND SCOTLAND

1. W. Cornwall
1b. Scilly
2. E. Cornwall
3. S. Devon
4. N. Devon
5. S. Somerset
6. N. Somerset
7. N. Wilts.
8. S. Wilts.
9. Dorset
10. Wight
11. S. Hants.
12. N. Hants.
13. W. Sussex
14. E. Sussex
15. E. Kent
16. W. Kent
17. Surrey
18. S. Essex
19. N. Essex
20. Herts.
21. Middlesex
22. Berks.
23. Oxon
24. Bucks.
25. E. Suffolk
26. W. Suffolk
27. E. Norfolk
28. W. Norfolk
29. Cambs.
30. Beds.
31. Hunts.
32. Northants.
33. E. Gloucs.
34. W. Gloucs.
35. Mons.
36. Herefs.
37. Worcs.
38. Warks.
39. Staffs.
40. Salop
41. Glam.
42. Brecs.
43. Rads.
44. Carms.
45. Pembs.
46. Cards.
47. Monts.
48. Merioneth
49. Caerns.
50. Denbs.
51. Flints.
52. Anglesey
53. S. Lincs.
54. N. Lincs.
55. Leics.
55b. Rutland
56. Notts.
57. Derbys.
58. Cheshire
59. S. Lancs.
60. W. Lancs.
61. S.E. Yorks.
62. N.E. Yorks.
63. S.W. Yorks.
64. Mid-W. Yorks.
65. N.W. Yorks.
66. Co. Durham
67. S. Northumb.
68. Cheviot
69. Westmorland
69b. Furness
70. Cumberland
71. Man
72. Dumfriess.
73. Kirkcudbrights.
74. Wigtowns.
75. Ayrs.
76. Renfrews.
77. Lanarks.
78. Peebless.
79. Selkirks.
80. Roxburghs.
81. Berwicks.
82. E. Lothian
83. Midlothian
84. W. Lothian
85. Fife
86. Stirlings.
87. W. Perth
88. Mid Perth
89. E. Perth
90. Angus
91. Kincardines.
92. S. Aberdeen
93. N. Aberdeen
94. Banffs.
95. Moray
96. Easterness
96b. Nairns.
97. Westerness
98. Main Argyll
99. Dunbarton
100. Clyde Is.
101. Kintyre
102. S. Ebudes
103. Mid Ebudes
104. N. Ebudes
105. W. Ross
106. E. Ross
107. E. Sutherland
108. W. Sutherland
109. Caithness
110. Outer Hebrides
111. Orkney
112. Shetland

IRELAND

H1. S. Kerry
H2. N. Kerry
H3. W. Cork
H4. Mid Cork
H5. E. Cork
H6. Co. Waterford
H7. S. Tipperary
H8. Co. Limerick
H9. Co. Clare
H10. N. Tipperary
H11. Co. Kilkenny
H12. Co. Wexford
H13. Co. Carlow
H14. Laois
H15. S.E. Galway
H16. W. Galway
H17. N.E. Galway
H18. Offaly
H19. Co. Kildare
H20. Co. Wicklow
H21. Co. Dublin
H22. Meath
H23. Westmeath
H24. Co. Longford
H25. Co. Roscommon
H26. E. Mayo
H27. W. Mayo
H28. Co. Sligo
H29. Co. Leitrim
H30. Co. Cavan
H31. Co. Louth
H32. Co. Monaghan
H33. Fermanagh
H34. E. Donegal
H35. W. Donegal
H36. Tyrone
H37. Co. Armagh
H38. Co. Down
H39. Co. Antrim
H40. Co. Londonderry



BOTANICAL SOCIETY OF THE BRITISH ISLES (B.S.B.I.)

The B.S.B.I. was founded in 1836 and has a membership of 2,850. It is the major source of information on the status and distribution of British and Irish flowering plants and ferns. This information, which is gathered through a network of county recorders, is vital for the conservation of the plants and is the basis of the *Red data books* for vascular plants in Great Britain and Ireland. The Society arranges conferences and field meetings throughout the British Isles and, occasionally, abroad. It organises plant distribution surveys and publishes plant atlases and handbooks on difficult groups such as sedges and willows. It has a panel of referees available to members to name problem plants. Through its Conservation Committee it plays an active part in the protection of our threatened plants. It welcomes all botanists, professional and amateur alike, as members.

Details of membership and any other information about the Society may be obtained from:

The Hon. General Secretary,
Botanical Society of the British Isles,
c/o Department of Botany,
The Natural History Museum,
Cromwell Road,
London, SW7 5BD.

INSTRUCTIONS TO CONTRIBUTORS

Scope. Authors are invited to submit Papers and Notes concerning British and Irish vascular plants, their taxonomy, biosystematics, ecology, distribution and conservation, as well as topics of a more general or historical nature. Authors should consult the Hon. Receiving Editor for advice on suitability or any other matter relating to submission of manuscripts.

Papers and Notes must be submitted *in duplicate*, typewritten on one side of the paper, with wide margins and double-spaced throughout. Submission of copy on computer discs is acceptable but must also be accompanied by two hard copies of the text, double spaced throughout.

Format should follow that used in recent issues of *Watsonia*. Underline where italics are required. Names of periodicals should be given in full, and herbaria abbreviated as in *British and Irish herbaria* (Kent & Allen 1984). The Latin names and English names of plants should follow the *New Flora of the British Isles* (Stace 1991). Further details on format can be obtained from the Hon. Receiving Editor.

Tables, figure legends & appendices should be typed on separate sheets and attached at the end of the typescript.

Figures should be drawn in black ink or be laser-printed and identified in pencil on the back with their number and the author's name. They should be no more than three times final size, bearing in mind they will normally be reduced to occupy the full width of a page. Scale-bars are essential on plant illustrations and maps. Lettering should be of high-quality and may be done in pencil and left to the printer. Black and white photographs can be accepted if they assist in the understanding of the article.

Contributors must sign a copyright declaration prior to publication which assigns the copyright of their material to the Botanical Society of the British Isles. Twenty-five offprints are given free to authors of Papers, Notes and Obituaries; further copies may be purchased in multiples of 25 at the current price. The Society takes no responsibility for the views expressed by authors of Papers, Notes, Book Reviews or Obituaries.

Submission of manuscripts

Papers and Notes: Dr B. S. Rushton, School of Applied Biological and Chemical Sciences, University of Ulster, Coleraine, Co. Londonderry, N. Ireland, BT52 1SA.

Books for Review: Dr C. D. Preston, Biological Records Centre, Monks Wood, Abbots Ripton, Huntingdon, PE17 2LS.

Plant Records: the appropriate vice-county recorder, who should then send them to Dr C. D. Preston, Biological Records Centre, Monks Wood, Abbots Ripton, Huntingdon, PE17 2LS.

Obituaries: Mrs M. Briggs, 9 Arun Prospect, Pulborough, West Sussex, RH20 1AL.

Back issues of Watsonia are handled by Dawson UK Limited, Cannon House, Folkestone, Kent, CT19 5EE to whom orders for all issues prior to Volume 20 part 1 should be sent.

Recent issues (Vol. 20 part 1 onwards) are available from Mr M. Walpole, B.S.B.I., 68 Outwoods Road, Loughborough, Leicestershire, LE11 3LY.

SMITHSONIAN INSTITUTION LIBRARIES
3 9088 01167 5386

Watsonia

August 1997 Volume twenty one Part four

Contents

COTTRELL, J. E., FORREST, G. I. & WHITE, I. M. S. The use of RAPD analysis to study diversity in British black poplar (*Populus nigra* L. subsp. *betulifolia* (Pursh) W. Wettst. (Salicaceae) in Great Britain 305–312

RICH, T. C. G., HOLYOAK, D. T., MARGETTS, L. J. & MURPHY, R. J. Hybridisation between *Gentianella amarella* (L.) Boerner and *G. anglica* (Pugsley) E. F. Warb. (Gentianaceae) 313–325

RICH, T. C. G. Scarce plants in Britain: have some been overlooked, and are others really Scarce? 327–333

FRYER, J. & HYLMÖ, B. Five new species of *Cotoneaster* Medik. (Rosaceae) in Britain 335–340

CRACKLES, F. E. Variation in some populations of *Calamagrostis stricta* (Timm) Koeler in the British Isles and the putative past hybridization with *C. canescens* (Wigg.) Roth 341–354

ALLEN, D. E. *Rubus* L. (Rosaceae) in the Isles of Scilly: a revised list ... 355–358

NOTES

Allen, D. E. The correct authority for *Rubus melanodermis* (Rosaceae) 359

Bull, A. L. The role of forestry plantings in the dispersal of bramble (*Rubus* L.) species 359–361

Bull, A. L. & Newton, A. *Rubus mercicus* J. E. Bagnall refound ... 361–362

Crompton, G. The 'J.D.' herbarium at Northampton Museum 362–364

Kent, D. H. The correct authority for Lesser Chickweed, *Stellaria pallida* (Caryophyllaceae) 364

Montgomery, L., Khalaf, M., Bailey, J. P. & Gornall, R. J. Contributions to a cytological catalogue of the British and Irish flora, 5 365–368

Pearman, D. *Carex humilis* Leysser in Dorset (v.c. 9) 368–374

Roberts, R. H. & Foley, M. J. Y. The taxonomic status of *Dactylorhiza majalis* (Rchb. fil.) P. F. Hunt & Summerh. subsp. *traunsteineri* (Saut. ex Rchb. fil.) H. Sund var. *bowmanii* M. N. Jenk. 374–376

Rumsey, F. J. *Asplenium viride* Hudson (Aspleniaceae) in Greater London 376–378

Welch, D. The distribution of brambles (*Rubus* spp.) in north-east Scotland 378–380

PLANT RECORDS 381–401

BOOK REVIEWS 403–410

OBITUARIES 411–418

Published by the Botanical Society of the British Isles

ISSN 0043-1532

Filmset by
WILMASET LTD, BIRKENHEAD, MERSEYSIDE
Printed in Great Britain by
EATON PRESS LIMITED, WESTFIELD ROAD, WALLASEY, MERSEYSIDE